



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY  
REGIONAL WATER QUALITY CONTROL BOARD  
CENTRAL VALLEY REGION

AMENDMENTS  
TO  
THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO  
RIVER AND SAN JOAQUIN RIVER BASINS

FOR  
THE CONTROL OF DIAZINON AND CHLORPYRIFOS RUNOFF INTO  
THE LOWER SAN JOAQUIN RIVER

PEER REVIEW DRAFT STAFF REPORT



*February 2004*

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*California Environmental Protection Agency*  
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**CENTRAL VALLEY REGION**

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## List of Acronyms and Abbreviations

§	Section (as in a law or regulation)
µg/L	Micrograms/liter (0.10 µg/L = 100 ng/L)
AI	Active Ingredient of a pesticide
Basin Plan	Water Quality Control Plan for the Sacramento River and San Joaquin River Basins
CCC	Criterion Continuous Concentration
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CMC	Criterion Maximum Concentration
Regional Board	Central Valley Regional Water Quality Control Board
CWA	Federal Clean Water Act
Water Code	California Water Code
Delta	Sacramento-San Joaquin Delta
DPR	California Department of Pesticide Regulation
DWR	California Department of Water Resources
ELISA	Enzyme-Linked Immunosorbent Assay
g/day	Grams/day
in	Inches
LA	Load Allocation
lbs	Pounds
LC	Loading Capacity
MOS	Margin of Safety
NCDC	National Climatic Data Center
ng/L	Nanograms/liter (100 ng/L = 0.10 µg/L)
NWIS	National Water Information System
Porter-Cologne	Porter-Cologne Water Quality Control Act
PUR	Pesticide Use Report
Regional Board	Regional Water Quality Control Board
State Board	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDL	Total Maximum Daily Load
UCIPM	University of California Integrated Pest Management Project
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WLA	Waste Load Allocation

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## Executive Summary

This report provides the technical and policy foundation for a proposed amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan). The amendment addresses impairments to the lower San Joaquin River (SJR) caused by the organophosphorous (OP) insecticides diazinon and chlorpyrifos. It proposes new numeric water quality objectives for chlorpyrifos and Total Maximum Daily Loads (TMDLs) for both these insecticides. Diazinon and chlorpyrifos waste load allocations for point sources and load allocations for non-point sources are included, and have been designed to meet existing and proposed water quality objectives for diazinon and chlorpyrifos in the lower SJR from the Mendota Dam to the Airport Way Bridge near Vernalis.

Monitoring since 1991 by state and federal agencies and other groups has confirmed the widespread presence of diazinon, chlorpyrifos, and other pesticides in the SJR and its tributaries. The San Joaquin River was placed on the Clean Water Act Section 303(d) List in 1994 for aquatic toxicity due to diazinon and chlorpyrifos. The sources of these compounds are agricultural and urban runoff. Agriculture will be the dominant source in the SJR Basin since the USEPA has banned the sale of all non-agricultural uses of diazinon and most non-agricultural uses of chlorpyrifos.

Pesticides applied to orchards and fields are transported primarily by stormwater runoff, and by drainage or runoff of irrigation water. Agricultural sources can be subdivided by season of application. Dormant season pesticide applications occur in the SJR Basin during the winter months, generally from December through February. During the dormant season, OP pesticides are carried to surface water by stormwater runoff. Pesticide residues deposited on trees and on the soil migrate with runoff water during rain events. Irrigation season applications generally occur from March through September. During the irrigation season, chlorpyrifos and diazinon move with irrigation water from agricultural fields to the SJR and tributaries that flow into the SJR.

**Designated Uses** - This amendment recommends that no changes be made to existing designated uses for the SJR. The use that is most sensitive to diazinon and chlorpyrifos (freshwater habitat beneficial use designation) has already been designated, so additional use designations are not necessary at this time.

**Water quality objectives** - This amendment recommends no new numeric water quality objectives for diazinon at this time. Further analysis of available information and additional studies should be conducted in order to finalize diazinon water quality objectives. Until further information is available, the best available information on diazinon toxicity should be used to evaluate compliance with the narrative toxicity and pesticide water quality objectives. For chlorpyrifos this amendment recommends adoption of Water Quality Criteria derived by the California Department of Fish and Game (using the USEPA method) as water quality objectives in the mainstem of the SJR.

**Implementation** - This amendment recommends that, if neither Waste Discharge Requirements (WDRs) nor a Waiver of WDRs apply to diazinon and chlorpyrifos discharges, then a prohibition of discharge would apply when objectives or allocations are not met. The prohibition is constructed to address the two seasons of use.

**TMDL Elements**-The amendment establishes the loading capacity, waste load allocations, and load allocations for diazinon and chlorpyrifos discharges to the San Joaquin River. The loading capacity and allocations are established at levels necessary to attain the applicable numeric and narrative water quality objectives. An additive toxicity formula is used to account for the joint toxicity of diazinon and chlorpyrifos. Load allocations are established by subarea. The allocations apply to both the irrigation and dormant season. Equating the allocations to the loading capacity provides an implicit margin of safety, since no dilution credit is given.

**Submission of Management Plans**-Dischargers must submit a management plan that describes the actions that the discharger will take to reduce diazinon and chlorpyrifos discharges during the dormant season and the irrigation season, and to meet the applicable allocations by the required compliance dates. Submission of a management plan is required no later than twelve months after approval of this Amendment by OAL.

**Surveillance and Monitoring** -Surveillance and monitoring required of dischargers will include water quality monitoring, evaluation of changes in pesticide use, surveys of adoption of management practices to reduce diazinon and chlorpyrifos in runoff, and an evaluation of the effectiveness of management practices in reducing pesticide runoff.

**Consideration of Economics and CEQA** - A discussion of the potential economic effects of the proposed amendment, as well as a CEQA checklist, are provided in this staff report. This proposed Basin Plan Amendment is designed to reduce diazinon and chlorpyrifos concentrations in the lower SJR, and to ensure that increased use of alternatives to those pesticides will not degrade water quality. The water quality objectives established by this amendment are designed to eliminate the impacts of diazinon and chlorpyrifos to aquatic life in the lower SJR. This Basin Plan Amendment does not require or allow any changes in pesticide application practices that could degrade the quality of the environment or have environmental effects that could cause substantial indirect or direct adverse effects on human beings.

# **1 Introduction, Background and Need for a Basin Plan Amendment**

## **1.1 Introduction**

This report provides the technical and policy foundation for a proposed amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan). This report provides an analysis of alternatives and evaluation of potential environmental impacts in accordance with California Environmental Quality Act (CEQA) and State Water Resources Control Board (SWRCB) regulations. The amendment addresses impairments to the lower San Joaquin River (SJR) caused by the organophosphorous (OP) insecticides diazinon and chlorpyrifos. It proposes new numeric water quality objectives for chlorpyrifos and Total Maximum Daily Loads (TMDLs) for both these insecticides. Diazinon and chlorpyrifos waste load allocations for point sources and load allocations for non-point sources are included, and have been designed to meet the proposed water quality objectives for diazinon and chlorpyrifos in the lower SJR from the Mendota Dam to the Airport Way Bridge near Vernalis.

California Water Code (Water Code) §13240 authorizes the Central Valley Regional Water Quality Control Board (Regional Board) to formulate and adopt Basin Plans for all areas within their region. The Basin Plan is the basis for regulatory actions taken for water quality control and satisfies §303 of the Federal Clean Water Act (CWA), which requires states to adopt water quality standards. Basin Plans are adopted and amended by the Regional Board through a structured process involving full public participation and state environmental review. Basin Plan amendments do not become effective until approved by the State Water Resources Control Board (State Board) and Office of Administrative Law (OAL). Additionally, U.S. Environmental Protection Agency (USEPA) approval is required for Basin Plan amendments that affect surface water quality standards.

If adopted, the Basin Plan amendment proposed as part of this report would establish:

- Numeric water quality objectives for chlorpyrifos in the lower SJR from the Mendota Dam to the Airport Way Bridge near Vernalis
- A diazinon and chlorpyrifos TMDL to meet the applicable water quality objectives
- New policies to achieve the water quality objectives and TMDL
- Specific monitoring goals to evaluate compliance with the proposed water quality objectives and TMDL.

Portions of the text of this report are similar to the Basin Plan Amendment Staff Report for the Control of Orchard Pesticide Runoff and Diazinon Runoff into the Sacramento and Feather Rivers (Karkoski, et al, 2003). The major differences between this report and the Basin Plan Amendment Staff Report for the Sacramento and Feather Rivers is that while the Sacramento and Feather Rivers are impaired by diazinon during the dormant season, the San Joaquin River is impaired by both diazinon and chlorpyrifos year-round.

### **1.1.1 Organization of the Basin Plan Amendment Staff Report**

**Section 1** - This section provides background information on the amendment process and the need for the amendment. It describes the two seasons of agricultural use (dormant season and irrigation season) of the two pesticides, and discusses historical water chemistry data collected from 1991 to the present.

**Section 2** – This section provides the proposed additions and changes in the Basin Plan language.

**Section 3** – This section provides a review of the existing laws and policies that pertain to this Basin Plan amendment.

**Section 4** – This section describes and evaluates the alternatives that were considered for modification of the Basin Plan. The following Basin Plan chapters were considered for modification.

- Introduction
- Existing and potential beneficial uses
- Water quality objectives
- Implementation
- Surveillance and monitoring

**Section 5** - Water Code Section §13141 requires that prior to implementation of any agricultural Basin Plan amendment, an estimate of the total cost of such a program and identification of sources of funding be indicated in the Basin Plan. Additionally, Water Code Section §13241 requires a consideration of economics for adoption of new water quality objectives. The economic analysis is presented in this section.

**Section 6** - The Basin Plan amendment process is a certified regulatory program pursuant to the California Environmental Quality Act (CEQA). The Basin Plan amendment staff report therefore serves as a substitute document for Environmental Impact Report or Negative Declaration. The CEQA checklist and conclusions of the CEQA analysis are contained in this section.

**Section 7** – The Basin Plan is amended by the Regional Board through a structured process involving full public participation and consultation with other appropriate state and federal agencies (e.g. USEPA, California Department of Pesticide Regulation [DPR]). A description of the public participation and agency consultation process for this amendment is contained in this section.

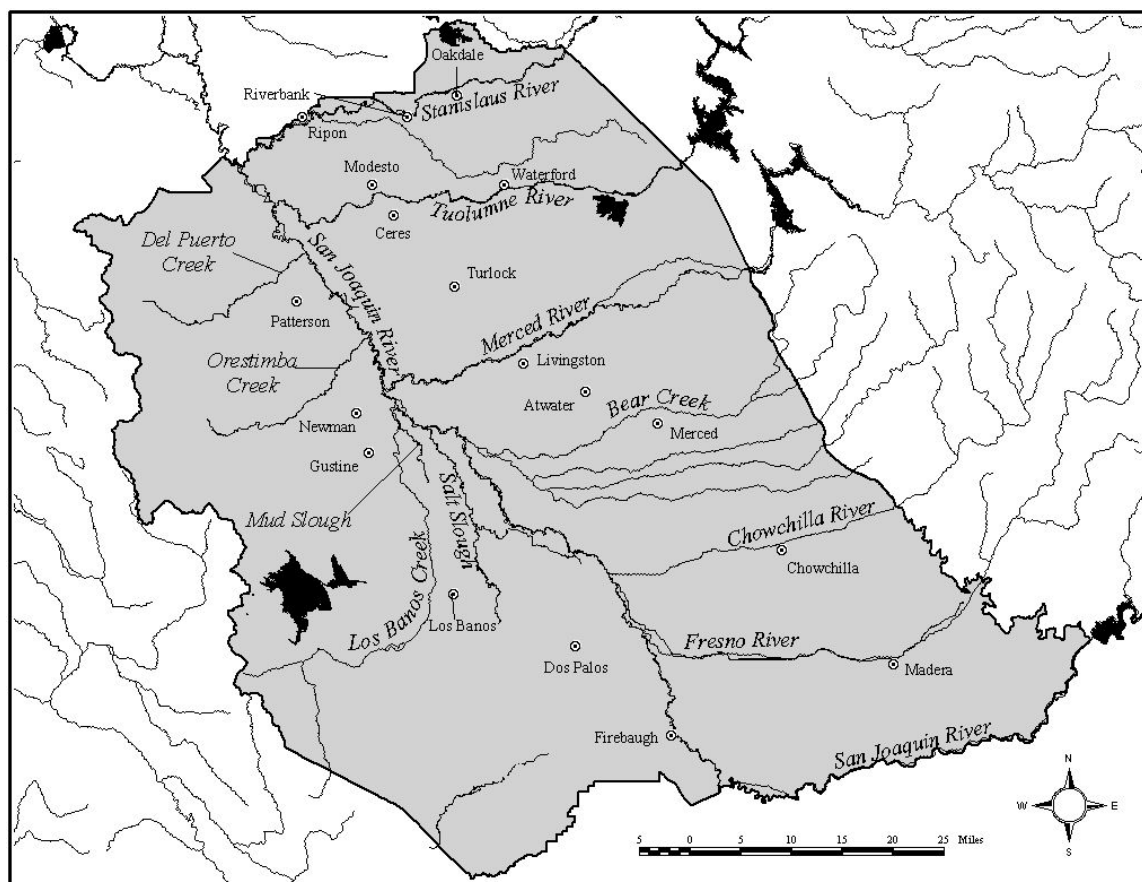
**Section 8** - References used in the development of this report are listed in this section.

**Appendices** – The appendices include supplemental information for the evaluation of alternatives.

- Appendix A- contains detailed descriptions of the project subareas
- Appendix B-contains pesticide use information for the subareas
- Appendix C-contains historical pesticide concentrations for individual sampling locations, and comprehensive historical pesticide concentration data
- Appendix D-contains detailed economic cost information and scenarios

### **1.1.2 Watershed Characteristics**

The SJR watershed is bounded by the Sierra Nevada Mountains on the east, the Coast Range on the west, the Delta to the north, and the Tulare Lake Basin to the south. From its source in the Sierra Nevada Mountains, the SJR flows southwesterly until it reaches Friant Dam. Below Friant Dam, the SJR flows westerly to the center of the SJR Basin near Mendota, where it turns northwesterly to eventually join the Sacramento River in the Sacramento-San Joaquin Delta (Delta). The main stem of the entire SJR is about 300 miles long and drains approximately 13,500 square miles (Figure 1.1).



**Figure 1.1 Location Map of the Lower SJR Basin**

The major tributaries to the SJR upstream of the Airport Way Bridge near Vernalis (the legal boundary of the Delta) are on the east side of the SJR Basin, with drainage basins in the Sierra Nevada Mountains. These major east side tributaries are the Stanislaus, Tuolumne, and Merced Rivers. The Cosumnes, Mokelumne, and Calaveras Rivers flow into the SJR downstream of the Airport Way Bridge. Several smaller, ephemeral streams flow into the SJR from the west side of the SJR Basin. These streams include Hospital, Ingram, Del Puerto, Orestimba, Panoche, and Los Banos Creeks. All have drainage basins in the Coast Range, flow intermittently, and contribute sparsely to water supplies. Mud Slough (north) and Salt Slough drain the Grassland Watershed on the west side of the SJR Basin. During the irrigation season, surface and subsurface agricultural return flows contribute greatly to these creeks and sloughs. Flows in the San Joaquin River are highly managed, and portions of the river are completely dry.

The geographic scope or project area of this amendment consists of 130 miles of the lower SJR, from the Mendota Dam to the Airport Way Bridge near Vernalis. The SJR Basin is the area draining to the SJR downstream of the Mendota Dam and upstream of the Airport Way Bridge near Vernalis. The SJR Basin includes the lower reaches of the major eastside tributaries, downstream of the major dams and reservoirs: New Don Pedro, New Melones, Lake McClure, and similar eastside reservoirs in the SJR Basin. The southeastern boundary of the project area is formed by the SJR from the Friant Dam to the Mendota Dam. The SJR Basin, as defined here, drains approximately 2.9 million acres, including approximately 1.4 million acres of agricultural land use. More detailed description of the project area can be found in Appendix A.

## **1.2 Background**

Monitoring since 1991 by state and federal agencies and other groups has confirmed the widespread presence of diazinon, chlorpyrifos, and other pesticides in the SJR and its tributaries. The Regional Board placed the San Joaquin River on the Clean Water Act Section 303(d) list due to aquatic toxicity caused by the diazinon and chlorpyrifos. The sources of these pesticides are agricultural and urban runoff, however agriculture is the dominant source in the SJR Basin. Pesticides applied to orchards and fields are transported by stormwater runoff and by runoff of irrigation water.

Aerial pesticide applications may result in direct drift to surface waters, and may be another source of pesticide contamination. For rice crops in Colusa and Glenn counties, aerial application of methyl parathion has been found to be a significant pathway (Kollman et al., 1992). Volatilization and atmospheric transport of pesticides are also likely to affect surface water quality. One study by the USGS (USGS, 1995) documented atmospheric deposition as a transport mechanism during runoff events, when precipitation and direct surface runoff are the major sources of streamflow. Locally high concentrations of pesticides in rain and air are very seasonal, correlated to local use, and usually occur during the spring and summer months. High concentrations of pesticides can also occur in rain, air, and fog during the fall and winter months in areas where there is high use, as in the stone-fruit orchards in the Central Valley. A second USGS study indicated that pesticides in precipitation could contribute significantly to pesticide loads in stormwater runoff (USGS, 2003). Further studies are being conducted by USGS to quantify the atmospheric deposition of chlorpyrifos, diazinon, and other pesticides in the SJR Basin.

Inappropriate mixing and loading practices, and poor disposal procedures during pesticide application can result in spills of concentrated liquid or dry material on the soil surface. Such spills may contribute to the presence of these pesticides in surface water. Additionally, conventional pesticide application technology (i.e. air-blast sprayer) is designed primarily for durability and ease of use, rather than for optimal efficiency of pesticide application to the tree or crop. Unlike many other countries, the U.S. has no standards for sprayer design, no performance standards and no testing procedures. A review of sprayer studies in orchards showed that 40 to 60% of the applied spray was deposited on the orchard floor, while only 9 to 16% was deposited on the trees (Giles and Downey, 2003).

### **1.2.1 Agricultural Sources and Seasonality**

Agricultural sources can be subdivided by season of application. Dormant season pesticide applications occur in the SJR Basin during the winter months, generally from December through February. During the dormant season, OP pesticides are carried to surface water by stormwater runoff. Pesticide residues deposited on trees and on the ground migrate with runoff water during rain events.

Irrigation season applications generally occur from March through September. During the irrigation season, residual chlorpyrifos and diazinon migrate with irrigation water and storm water from agricultural fields and enter tributaries that flow into the SJR. During both seasons, localized drift from pesticide applications and atmospheric deposition can also contribute to pesticides being introduced into surface water, although to a lesser degree than runoff. Although practices are available to minimize pesticide drift, once pesticides enter the atmosphere through volatilization only natural degradation limits their movement and fallout during rainstorms.

#### **Dormant Season Use**

Pesticides applied during the dormant season, from December through February, are periodically washed off fields by storms large enough to generate runoff. For the project area, studies have shown that the amount of pesticide washed off is usually a very small fraction of the amount applied, ranging between 0.05 and 0.13 percent for diazinon and 0.06 to 0.08 percent for chlorpyrifos (Kratzer et al., 2002; Kratzer, 1999). Although the quantity of pesticide is small, it is large enough to cause toxicity to aquatic invertebrates. These invertebrates provide the foundation for the aquatic food web, upon which higher trophic levels, such as salmon and other fishes, depend.

The amount of pesticide available to be carried by runoff will be approximately equal to the amount applied during the dry period preceding the rainfall event, minus any that has volatilized, degraded, infiltrated into the ground, or remained bound to sediment particles at the ground surface. Highest concentrations have been observed to coincide with the first major storm after a prolonged dry period. During the winter precipitation season, the high variability in pesticide concentrations is attributed to rapid changes in the source of stream flow during a storm.

In addition to the amount of pesticide applied, other factors are likely to affect the amount of pesticide in storm runoff and pesticide loading. Soils with poor drainage characteristics, such as those on the west side of the SJR Basin (where the soil is fine-grained and highly erodible), may have higher runoff potential than the more permeable soils on the east side. Antecedent moisture conditions may also be important. Pesticides applied to fields with higher moisture content may be expected to generate larger storm loads than if the soil was drier. When soils are dry, more precipitation, and dissolved pesticide, will be lost through infiltration into the soil. Other factors affecting runoff include field slope and the presence and type of cover crop.

#### **Irrigation Season Use**

The irrigation season (in-season) is defined as the months of March through September, although storms occasionally occur during the earlier months of this period. During the irrigation season, diazinon and chlorpyrifos migrate with irrigation water from agricultural fields and enter

tributaries that flow into the lower SJR. In contrast to the dormant season, irrigation season loading in the SJR Basin is continuous, with concentrations often above the chronic or acute toxicity levels.

Irrigation methods may affect the magnitude of pesticide loading in the river. With furrow or flood irrigation, tailwater drains from the end of the field and is usually discharged to a drainage channel that leads to a stream. In some cases, systems are in place to recycle tailwater to another field, or to blend it with fresh irrigation water and reapply it to another field. Tailwater return flows from flood and furrow irrigation probably generate the largest loads because large volumes of water are discharged directly. Relative to flood and furrow irrigation, sprinkler irrigation is likely to increase pesticide wash-off from foliage, but will generate less tailwater if used appropriately. Drip irrigation systems typically generate little or no runoff. If appropriately used, such irrigation methods are likely to minimize irrigation season pesticide loading.

### **1.2.2. Urban Pesticide Use**

#### **Urban Residential Use**

Diazinon and chlorpyrifos from urban sources are primarily introduced into surface water through storm runoff and over watering. In addition, agricultural pesticide applications can drift into urban areas and fall out during storms (USGS, 2003). Unlike agricultural pesticide use, which must be reported to the DPR, pesticides used in the urban environment include both reported and unreported uses. Only professional urban applications must be reported to DPR. Professional applications include structural and landscape pest control, and restaurant and commercial building pest-control. Residential pesticide use, such as animal-care products, and home and garden pest control are not reported. Chlorpyrifos is no longer available for urban residential uses, and diazinon will not be available for retail sale after December 31, 2004. Consumers will be able to use their remaining supplies until depleted. The ban on residential urban use of chlorpyrifos, and the phase-out of urban use of diazinon should eventually reduce the potential for water quality impacts from these pesticides in urban areas. Pyrethroids and carbamates are being used as replacements for many urban (and agricultural) uses, and these may also cause aquatic toxicity impacts (TDC Environmental, 2003).

#### **Urban Non-Residential Use**

Sale of both diazinon and chlorpyrifos for use in indoor and outdoor areas where children could be exposed (schools, playgrounds, parks) was cancelled by recent USEPA regulations. Sale of chlorpyrifos for indoor use was cancelled effective December 31, 2001. Sale of diazinon for indoor use was prohibited effective December 31, 2002. A few “low risk” uses of chlorpyrifos, where children are not exposed are still permitted. These uses include ship holds, railroad boxcars, industrial plants, manufacturing plants, food processing plants, golf courses, road medians, treatment of utility poles and other outdoor wood products, fire ant mounds and mosquito control.

### **1.2.3 Historical Diazinon and Chlorpyrifos Agricultural Use Data Summary**

This discussion refers to data Tables 1.1 through 1.4, which provide a summary of diazinon and chlorpyrifos use on agricultural crops from 1995 to 2002. All data in these tables were obtained from the CDPR Pesticide Use Report (PUR) database.

### Diazinon

Between 1995 and 2002, diazinon was used on more than 40 agricultural commodities. The majority of diazinon use (by weight) occurs in the dormant season. The crops that accounted for 98% of diazinon dormant season use by weight were, in order of greatest to least use, almonds (65%), peaches (14%), apricots (6%), prunes (4%), apples (4%), nectarines (3%) and plums (2%). Irrigation season crops that accounted for 86% of diazinon use were almonds (27%), cantaloupe (11%), peaches (9%), tomatoes (7%), melons (7%), prunes (7%), walnuts (5%), apricots (4%), alfalfa (4%), nectarines (3%) and plums (2%). Overall diazinon use during both seasons has declined significantly since 1995. Almonds are by far the largest user of diazinon in the TMDL area, and the number of growers who applied diazinon in the dormant season decreased by 56% from 1995 to 2002. Many growers have switched to the use of pyrethroids (Zhang and Zhang. 2004). Figures 1.2 and 1.3 illustrate examples of the distribution of diazinon use in the TMDL area for the dormant and irrigation seasons of 2002. Preliminary PUR results for 2003 indicate that diazinon use appears to continue to decline.

The rankings of diazinon use during the dormant season in the San Joaquin subareas, from highest to lowest are Fresno-Chowchilla, Northeast Bank, Westside Creeks, Merced, Bear Creek, Turlock, Grasslands, Stanislaus, Tuolumne, and Greater Orestimba. During the irrigation season the rankings are Fresno-Chowchilla, Greater Orestimba, Westside Creeks, Bear Creek, Northeast Bank, Tuolumne and Merced (Appendix B).

### Chlorpyrifos

Chlorpyrifos has been used on more than 45 crops during the same time period. The crops that accounted for 90% of dormant season use (by weight) were, in order of greatest to least use, almonds (53%), apples (19%), peaches (13%) and alfalfa (5%). The majority of chlorpyrifos use (by weight) occurs in the irrigation season. Irrigation season crops that accounted for 92% of use were almonds (39%), cotton (16%), alfalfa (15%), walnuts (14%), corn (5%) and apples (3%). As with diazinon, Chlorpyrifos use during both seasons, has declined significantly since 1995. Almonds are the major dormant season chlorpyrifos user, and the number of almond growers who applied chlorpyrifos decreased from 80 in 1995 to 29 in 2002. From 1995 to 2002, chlorpyrifos use during the irrigation season decreased by 26% in almonds, 91% on cotton and 64% on alfalfa. (Zhang and Zhang. 2004). Figures 1.4 and 1.5 illustrate examples of the distribution of chlorpyrifos use in the TMDL area for the dormant and irrigation seasons of 2002. Preliminary PUR results for 2003 indicate that chlorpyrifos use appears to have increased during the irrigation season.

Use ranking by subarea in the dormant season is Fresno-Chowchilla, Merced, Northeast Bank, Bear Creek, Tuolumne and Turlock. Irrigation season use ranking is Grasslands, Fresno-Chowchilla, Merced, Tuolumne, Northeast Bank, Bear Creek, Turlock, Greater Orestimba, Stanislaus and North Stanislaus (Appendix B).

**Table 1.1. Dormant Season Agricultural Use of Diazinon by crop in Lower SJR Basin (1995-2002) in lbs. of a.i.**

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	28,893	35,134	18,743	33,640	37,948	10,668	18,719	17,680	25,178	65.32%
PEACH	7,383	6,518	4,599	5,353	5,552	4,022	4,068	5,499	5,374	13.94%
APRICOT	6,622	3,945	920	2,712	2,350	2,516	113	113	2,411	6.26%
PRUNE	2,676	1,269	1,213	486	1,851	1,273	821	2,840	1,554	4.03%
APPLE	3,113	2,593	2,514	1,008	752	686	446	395	1,438	3.73%
NECTARINE	1,452	1,219	1,046	1,213	1,306	1,213	1,151	794	1,174	3.05%
PLUM	1,259	953	786	779	681	837	982	456	842	2.18%

\* % Average values do not sum to 100% as crops with less than 1% average use are not shown

**Table 1.2. Irrigation (in-season) Agricultural Use of Diazinon by Crop in Lower SJR (1995-2002) in lbs. of a.i.**

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	35,371	13,050	2,134	227	683	168	90	2	6,466	26.84%
CANTALOUPE	2,963	3,185	4,297	877	2,977	2,163	2,797	2,653	2,739	11.37%
PEACH	3,954	3,807	2,433	993	1,670	2,375	2,376	597	2,276	9.45%
TOMATO	2,207	1,701	363	835	812	3,765	2,977	695	1,670	6.93%
MELON	2,111	1,630	1,897	1,616	1,982	1,007	964	1,979	1,648	6.84%
PRUNE	984	1,210	518	4,205	1,979	2,302	414	1,311	1,615	6.71%
WALNUT	2,137	1,634	2,606	975	311	1,357	1,398	61	1,310	5.44%
APRICOT	2,075	1,631	894	1,186	1,544	743	212	83	1,046	4.34%
ALFALFA	3,099	3,456	177	307	1	0	0	0	880	3.65%
APPLE	1,742	1,877	528	283	771	587	292	723	850	3.53%
NECTARINE	1,451	1,140	569	430	727	1,282	750	113	808	3.35%
PLUM	1,433	976	364	157	350	225	274	21	475	1.97%
BEANS	498	538	845	254	10	829	100	0	384	1.59%
WATERMELON	158	212	798	300	377	131	186	131	287	1.19%
GRAPE, WINE	621	281	268	82	202	40	68	381	243	1.01%

\* % Average values do not sum to 100% as crops with less than 1% average use are not shown

**Table 1.3. Dormant Season Agricultural Use of Chlorpyrifos by crop in Lower SJR Basin (1995-2002) in lbs. of a.i.**

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	9,668	10,430	3,966	6,625	8,109	1,520	7,509	7,844	6,959	52.65%
APPLE	4,713	3,006	2,867	2,626	2,433	1,751	1,415	1,190	2,500	18.92%
PEACH	2,754	1,803	1,066	785	1,040	832	2,120	3,002	1,675	12.68%
ALFALFA	1,868	427	816	15	70	2,266	136	105	713	5.39%
FIG	0	0	0	0	259	0	4,871	0	641	4.85%
NECTARINE	48	60	319	241	407	244	97	32	181	1.37%
GRAPE	0	0	704	40	0	203	214	24	148	1.12%

\* % Average values do not sum to 100% as crops with less than 1% average use are not shown

**Table 1.4. Irrigation (in-season) Agricultural Use of Chlorpyrifos by Crop in Lower SJR (1995-2002) in lbs. of a.i.**

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	Average	% Average*
ALMOND	71,339	93,617	104,911	109,162	76,902	88,371	76,374	55,776	84,556	39.23%
COTTON	116,733	24,561	44,867	23,104	18,960	17,656	20,716	5,666	34,033	15.79%
ALFALFA	59,720	46,583	36,515	40,857	22,684	25,180	17,163	14,682	32,923	15.28%
WALNUT	34,281	34,829	31,196	28,923	26,436	24,160	29,588	26,002	29,427	13.65%
CORN	13,250	7,403	11,551	8,812	13,110	12,932	7,475	7,077	10,201	4.73%
APPLE	10,710	9,334	9,955	12,542	4,459	2,290	662	66	6,252	2.90%
SUGARBEET	3,455	3,478	4,842	6,505	7,216	3,234	3,152	2,327	4,276	1.98%
ORANGE	4,060	2,937	1,782	5,092	7,010	2,059	2,936	3,885	3,720	1.73%
SWEET POTATO	1,122	1,794	2,691	3,061	5,571	3,964	5,539	721	3,058	1.42%
GRAPE	0	514	1,117	5,964	3,808	2,243	5,253	2,569	2,684	1.25%

\* % Average values do not sum to 100% as crops with less than 1% average use are not shown.

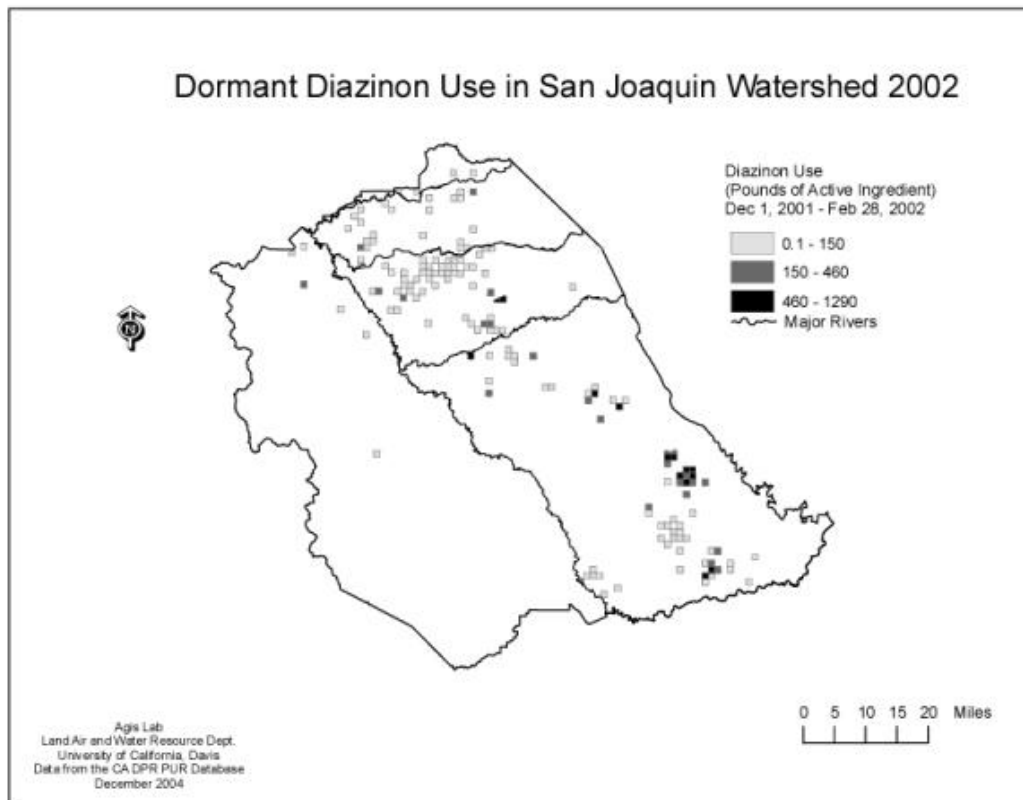


Figure1.2

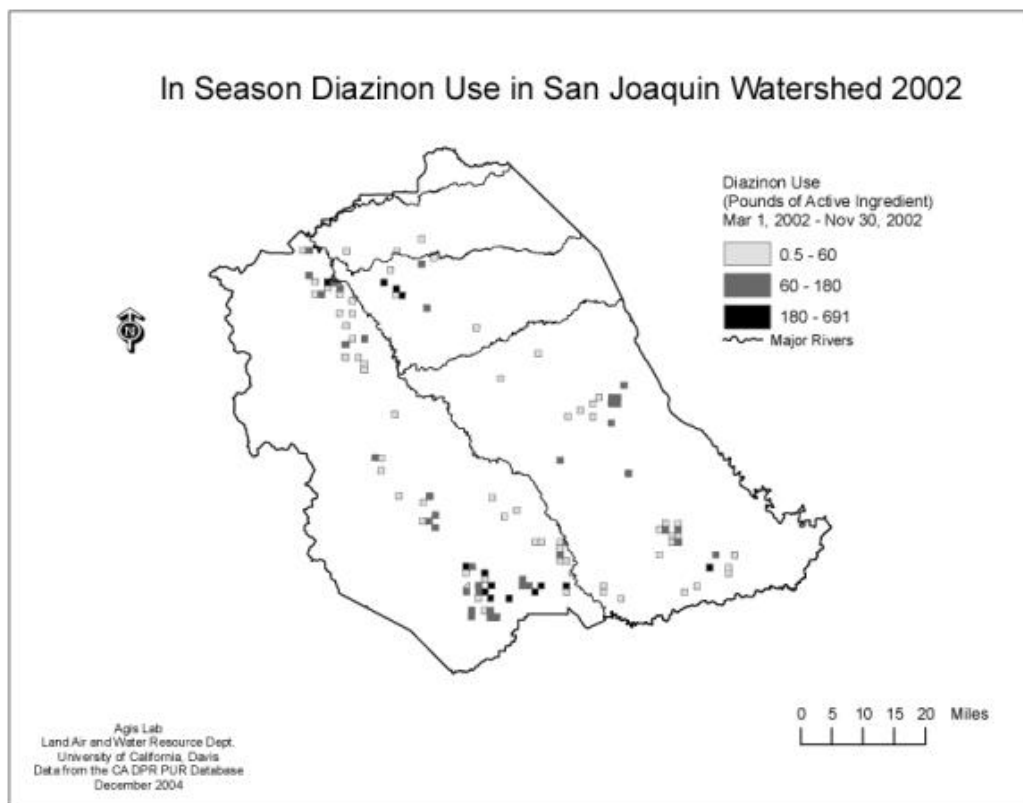


Figure1.3

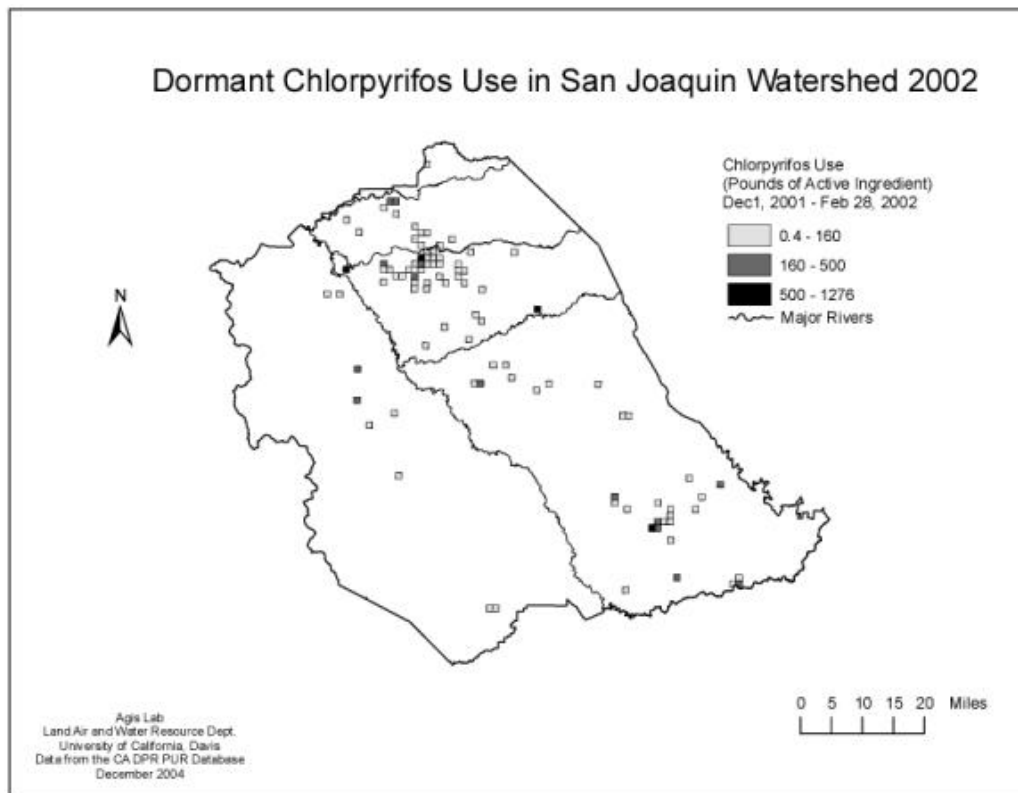


Figure 1.4

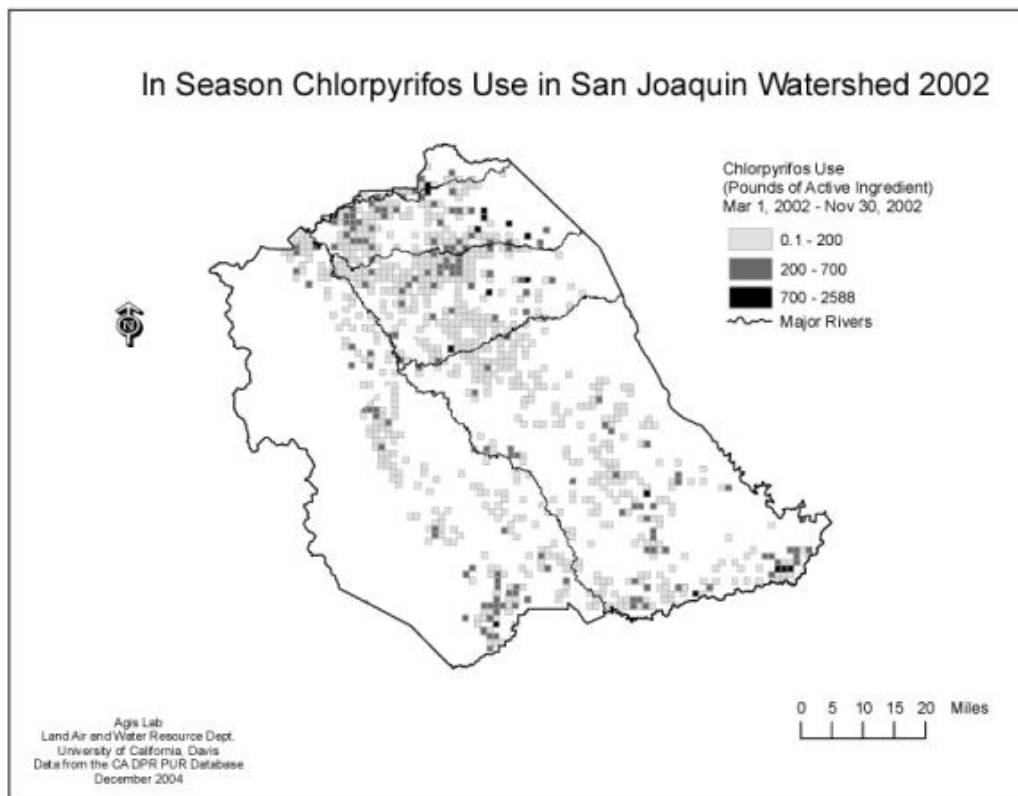


Figure 1.5

### **1.2.5 Historical Water Quality Data Summary**

Pesticide water quality data have been collected in the SJR by a variety of agencies and organizations since the 1980's (Domagalski et.al. 1997; Foe, 1995; Foe and Sheipline, 1993; Kratzer 1999; Kratzer et.al. 2002; MacCoy et.al. 1995; Ross et.al.; USGS, 1995; USGS 2003; Appendix C). Figures 1.6 through 1.11 and Tables 1.5 through 1.8 illustrate water quality data collected in the SJR from 1991 to the present. Pesticide concentrations are plotted on a logarithmic scale. Non-detect concentrations are treated as zero values (0 µg/L). The proposed acute diazinon toxicity value for salmonids (0.10 µg/L) and the proposed acute chlorpyrifos toxicity value (0.025 µg/L) are plotted for reference as horizontal lines on the appropriate graphs. Graphs are included for diazinon and chlorpyrifos concentrations and also for combined (additive) toxicity. Combined (cumulative) diazinon and chlorpyrifos toxicity values were determined using the equation provided below (CRWQCB-CVR. 1998):

$$\frac{C_1}{O_1} + \frac{C_2}{O_2} = S$$

Where:

C = The concentration of each pesticide.

O = The proposed acute toxicity water quality target for diazinon to protect invertebrates (0.16 µg/L) and the proposed acute water quality objective for chlorpyrifos (0.025 µg/L).

S = The sum. A sum equal to, or exceeding, one (1.0) indicates that the beneficial use may be impacted.

Rates of exceedance of proposed water quality values were calculated for both mainstem sites (Tables 1.5, 1.6, 1.7) and tributary sites (Table 1.8). These exceedance rates were defined as the number of samples that exceeded the appropriate water quality value, divided by the total number of samples collected, expressed as a percentage. The Tables show annual exceedance rates from 1991 through 2004. For comparison, an acceptable exceedance rate for standard USEPA water quality criteria for toxics are expressed as a one in three year exceedance rate (USEPA, 1985). This rate can also be expressed as a less than 0.1% exceedance rate.

#### **San Joaquin River Mainstem Sites**

##### **Diazinon**

Figure 1.6 shows diazinon concentration data collected in the mainstem SJR from 1991 through 2004. These data indicate that water column concentrations of diazinon have generally declined over time, however the number of exceedances of the water quality target also appears to be a function of the sampling intensity.

Table 1.5 shows that exceedance rates in the mainstem have ranged from 0% up to 50%, however the highest exceedance rates are associated with small sample numbers (n=2). The higher rates generally occurred during the early 1990's, although exceedance rates of about 20% were observed as recently as 2001, when sampling activity was relatively intense. No exceedances were detected from 2002 through 2004. This may be a result of the declining use of

diazinon. The lack of exceedances may also be affected by the paucity of storms of sufficient magnitude to generate runoff and by a less intense sampling effort.

### **Chlorpyrifos**

Figure 1.7 shows chlorpyrifos concentration data collected in the mainstem SJR from 1991 through 2004. These data indicate that water column concentrations of chlorpyrifos have decreased slightly over time. Four exceedances have been found during the most recent 5-year time period.

Table 1.6 shows that exceedance rates have ranged from 0% to 50%, although the highest rate was associated with a low sample number ( $n = 2$ ), and occurred in 1993. Exceedance rates during the most recent 5-year period ranged from 0% to 12%, and most of these data are based upon relatively large sample numbers.

### **Combined Toxicity**

Figure 1.8 shows combined diazinon and chlorpyrifos concentration data collected in the mainstem SJR from 1991 through 2004. These data are shown using the formula described at the beginning of this section. A reference line is provided at one (1). Values above one indicate non-attainment of applicable toxicity and pesticide objectives. These data indicate that the toxicity of the combined pesticide concentrations exceeded one from 1991 through 1995, and again from 2000 through 2004. The magnitude and number of exceedances is less during the most recent 5 year time period than it was during the early 1990's. Between 1996 and 1999, the intensity of sampling may have been too low to identify any instances where combined toxicity occurred.

Table 1.7 shows that exceedance rates ranged from 0% to 50%, although again the highest rates were associated with low sample numbers ( $n=2$ ). During the most recent 5-year time period, rates of exceedance of the combined toxicity value of 1 ranged from 0% to 19%, with sample numbers ranging from 9 to 71.

### Tributary Sites

As discussed later, allocations are assigned to the watersheds that discharge into different reaches of the San Joaquin River. The allocations are defined to be equivalent to the loading capacity in the San Joaquin River (i.e. the targets for the San Joaquin River apply to the discharge from the watersheds). The following discussion presents data from tributaries to the San Joaquin River in comparison to the proposed allocations. Note that the allocations would not apply to the whole tributary stream reach, but only to the discharge point to the San Joaquin River. The data for 1996 and 1997 is dominated almost exclusively by results from a special study on Orestimba Creek.

### **Diazinon**

Figure 1.9 shows diazinon concentration data collected in the SJR tributaries from 1991 through 2004. Since a number of the tributaries are dominated by agricultural runoff and have less dilution available, the magnitude and number of exceedances is greater than in the San Joaquin River. A comparison of the most recent 5-year period to the early and mid-1990's indicates that peak concentrations have decreased.

**Chlorpyrifos**

Figure 1.10 shows chlorpyrifos concentration data collected in the SJR tributaries from 1991 through 2004. The greater magnitude and number of exceedances seen for diazinon is also apparent for chlorpyrifos. The general trend of lower peak concentrations in the most recent 5-year period is also observed for chlorpyrifos.

**Combined Toxicity**

Table 1.8 shows that exceedance rates ranged from 0% to 100%, although the highest rates (and some of the lowest rates) were associated with low sample numbers ( $n=1$  or  $2$ ). During the most recent 5-year time period, rates of exceedance of the combined toxicity value of 1 ranged from 0% to 45%, with sample numbers ranging from 2 to 49. Del Puerto Creek and Orestimba Creek showed the greatest pattern of consistently exceeding the combined toxicity value. Exceedance rates in these two tributaries ranged from 14% to 45%, with total sample numbers ranging from 11 to 46. A comparison of the most recent 5-year period to the early 1990's suggests that the frequency of exceedance has decreased.

Figure 1.11 displays the combined toxicity data for the SJR tributaries. The trends observed for diazinon and chlorpyrifos are also apparent for the combined toxicity. The magnitude of exceedances are greater than in the San Joaquin River and the peak of the combined toxicity has decreased in the most recent 5-year time period.

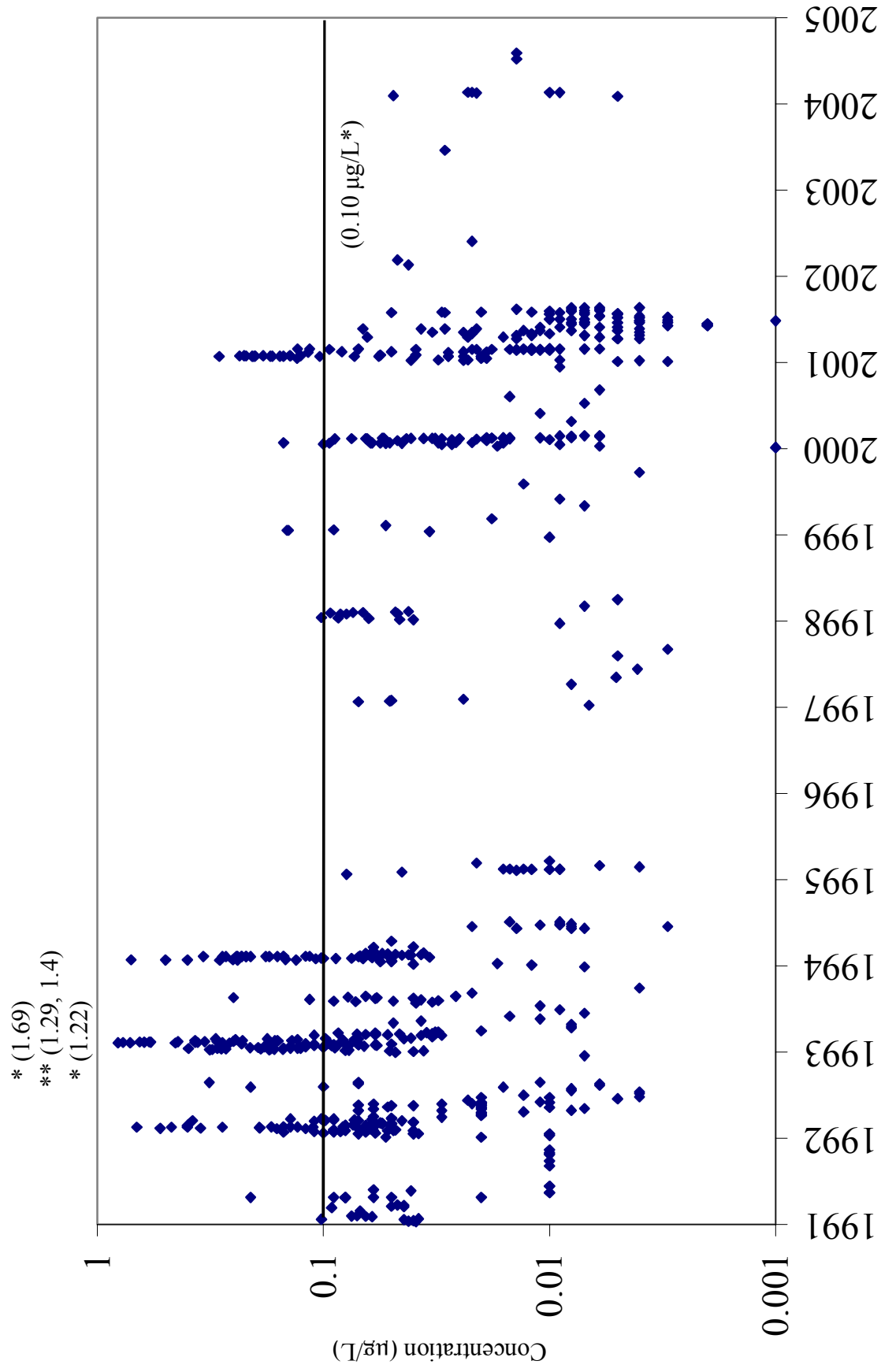


Figure 1.6. Diazinon Concentrations for SJR at all mainstem stations 1991-2004

Data not shown includes 853 non-detect concentration values. \* Acute toxicity water quality target = 0.10  $\mu\text{g/L}$

Table 1.5. Annual Exceedances of Proposed Diazinon Acute Toxicity Target at the Mainstem Sites of the San Joaquin River

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SJR near Vernalis	<b>6.2%</b> <sup>a</sup> 160 <sup>b</sup>	<b>4.5%</b> 200	<b>17%</b> 266	<b>22%</b> 120	<b>0%</b> 14	NS <sup>c</sup>	<b>0%</b> 34	<b>2.3%</b> 43	<b>4.5%</b> 44	<b>0%</b> 74	<b>20%</b> 65	<b>0%</b> 11	<b>0%</b> 36	<b>0%</b> 31
SJR at Maze Blvd.	<b>0%</b> 3	<b>40%</b> 5	<b>10%</b> 20		NS	NS	NS	NS	NS	NS	<b>0%</b> 20	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<b>0%</b> 23	<b>0%</b> 6	<b>0%</b> 34	<b>0%</b> 15
SJR near Patterson	NS	NS	NS	<b>0%</b> 5	NS	NS	NS	NS	NS	<b>0%</b> 1	<b>0%</b> 40	<b>0%</b> 9	NS	NS
SJR near Newman	<b>0%</b> 5	<b>9.1%</b> 22	<b>50%</b> 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevinson at Lander Ave.	<b>0%</b> 3	<b>20%</b> 5	<b>50%</b> 2	<b>0%</b> 1	NS	NS	NS	NS	NS	<b>5%</b> 20	<b>21%</b> 43	NS	<b>0%</b> 16	NS

Proposed Diazinon Acute Toxicity Target = 0.10 µg/L

<sup>a</sup>Percent of samples for the year that exceed the proposed diazinon acute toxicity target value.

<sup>b</sup>Total number of samples analyzed for diazinon during the year.

<sup>c</sup>NS = No samples analyzed during the year.

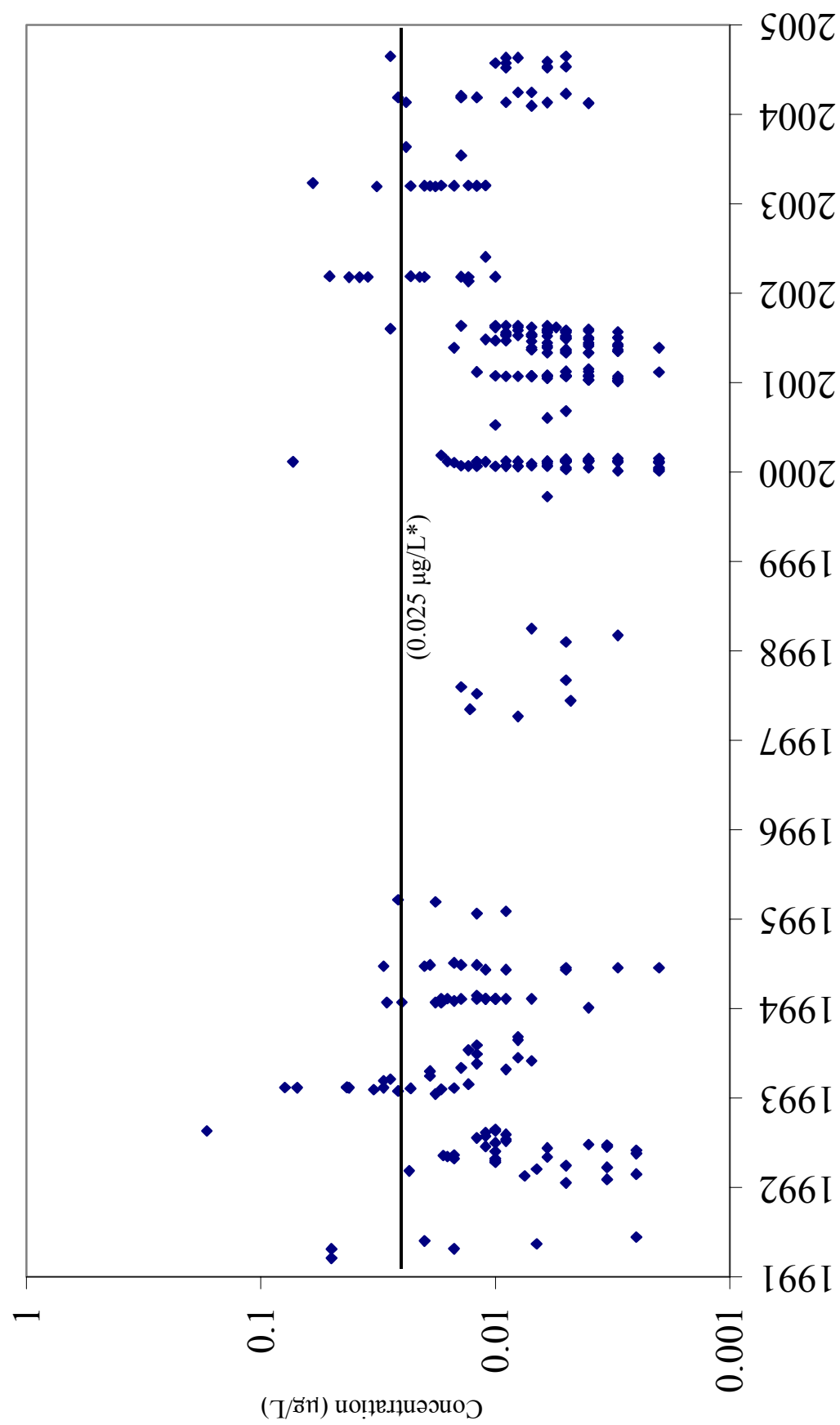


Figure 1.7. Chlorpyrifos Concentrations for SJR at all mainstem stations 1991-2004  
 Data not shown includes 997 non-detect concentration values.  
 \*Acute water quality objective for chlorpyrifos = 0.025 µg/L

Table 1.6. Annual Exceedances of Proposed Chlorpyrifos Acute Toxicity Water Quality Objective at the Mainstem Sites of the San Joaquin River

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SJR near Vernalis	<b>0%<sup>a</sup></b> 161 <sup>b</sup>	<b>0.51%</b> 19	<b>3.5%</b> 254	<b>1.7%</b> 118	<b>7.1%</b> 14	NS <sup>c</sup>	<b>0%</b> 34	<b>0%</b> 12	<b>0%</b> 43	<b>0%</b> 75	<b>0%</b> 65	<b>0%</b> 11	<b>0%</b> 39	<b>3.2%</b> 31
SJR at Maze Blvd.	<b>0%</b> 3	<b>0%</b> 5	<b>0%</b> 2	NS	NS	NS	NS	NS	NS	NS	<b>0%</b> 20	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<b>8.7%</b> 23	<b>50%</b> 6	<b>3%</b> 33	<b>6.7%</b> 15
SJR near Patterson	NS	NS	NS	<b>20%</b> 5	NS	NS	NS	NS	NS	<b>0%</b> 1	<b>0%</b> 40	<b>12%</b> 8	NS	NS
SJR near Newman	<b>0%</b> 28	<b>0%</b> 28	<b>0%</b> 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevenson at Lander Ave.	<b>0%</b> 3	<b>0%</b> 5	<b>50%</b> 2	<b>0%</b> 1	NS	NS	NS	NS	NS	<b>5%</b> 20	<b>0%</b> 43	NS	<b>5.9%</b> 17	NS

Proposed Chlorpyrifos Acute Toxicity Water Quality Objective = 0.025 µg/L

<sup>a</sup>Percent of samples for the year that equal or exceed the proposed chlorpyrifos acute toxicity water quality objective value.<sup>b</sup>Total number of samples analyzed for chlorpyrifos during the year.<sup>c</sup>NS = No samples analyzed during the year.

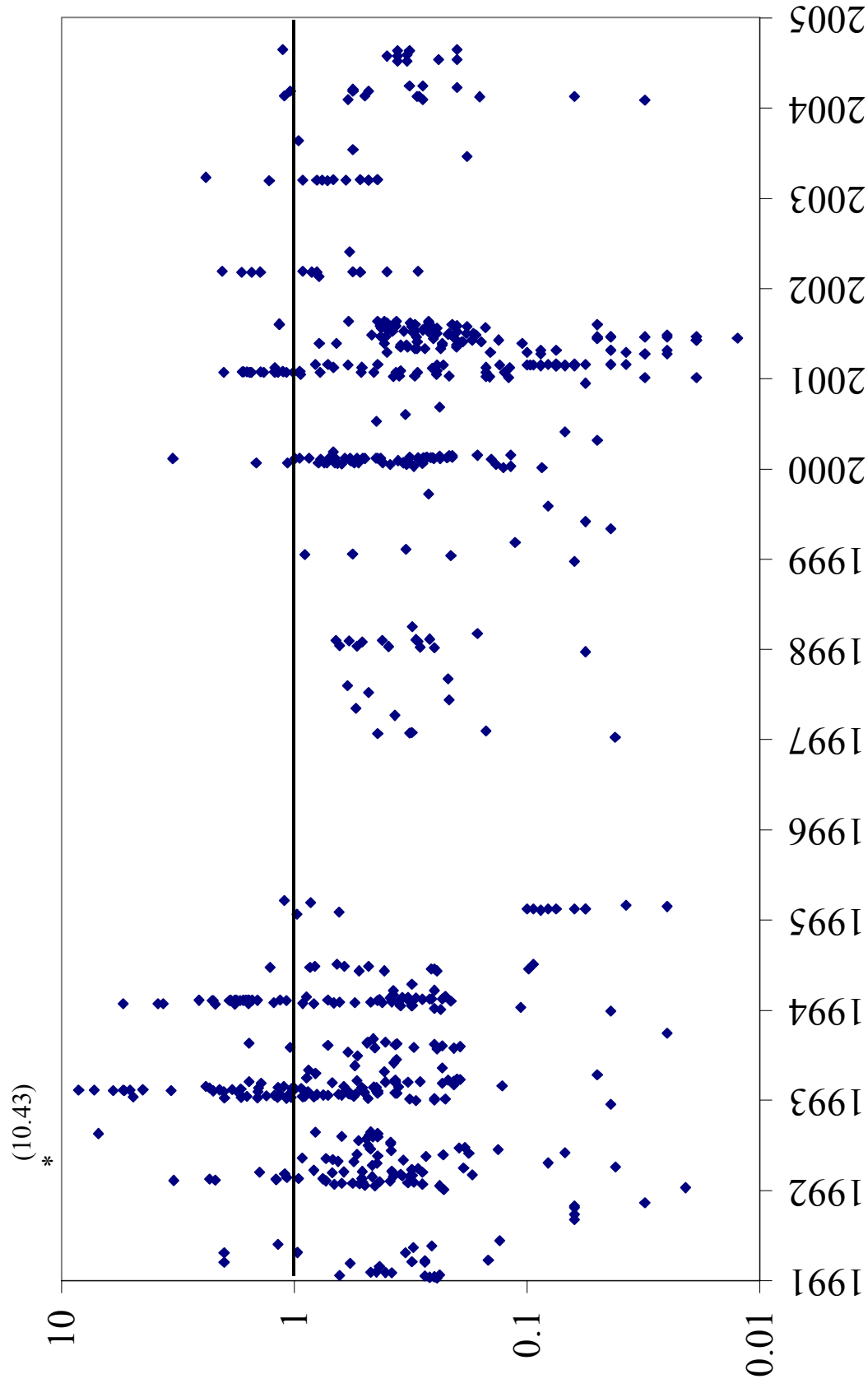


Figure 1.8. Combined chlorpyrifos and diazinon toxicity in San Joaquin River at all mainstem stations  
Data not shown includes 650 non-detect concentration values.

Table 1.7. Annual Exceedances of Combined Diazinon and Chlorpyrifos Toxicity at the Mainstem Sites of the San Joaquin River

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
SJR near Vernalis	<b>0%<sup>a</sup></b> 169 <sup>b</sup>	<b>3%</b> 200	<b>15%</b> 264	<b>22%</b> 103	<b>7.1%</b> 14	<b>0%</b> 3	<b>0%</b> 35	<b>2.4%</b> 42	<b>2.4%</b> 42	<b>1.4%</b> 71	<b>19%</b> 64	<b>0%</b> 12	<b>0%</b> 42	<b>6.1%</b> 33
SJR at Maze Blvd.	<b>0%</b> 2	<b>20%</b> 5	<b>50%</b> 2	NS <sup>c</sup>	NS	NS	NS	NS	NS	NS	<b>0%</b> 20	NS	NS	NS
SJR at Crows Landing	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<b>8.7%</b> 23	<b>38%</b> 8	<b>2.8%</b> 36	<b>6.7%</b> 15
SJR near Patterson	NS	NS	NS	<b>20%</b> 5	NS	NS	NS	NS	NS	<b>0%</b> 1	<b>0%</b> 40	<b>11%</b> 9	NS	NS
SJR near Newman	<b>4.5%</b> 22	<b>4.5%</b> 22	<b>50%</b> 2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SJR near Stevinson at Lander Ave.	<b>0%</b> 3	<b>0%</b> 5	<b>50%</b> 2	<b>0%</b> 1	NS	NS	NS	NS	NS	<b>10%</b> 20	<b>14%</b> 43	NS	<b>5.9%</b> 17	NS

<sup>a</sup>Percent of samples for the year for which the combined (additive) toxicity value equals or exceeds 1.0.<sup>b</sup>Total number of samples analyzed for chlorpyrifos and/or diazinon during the year.<sup>c</sup>NS = No samples analyzed during the year.

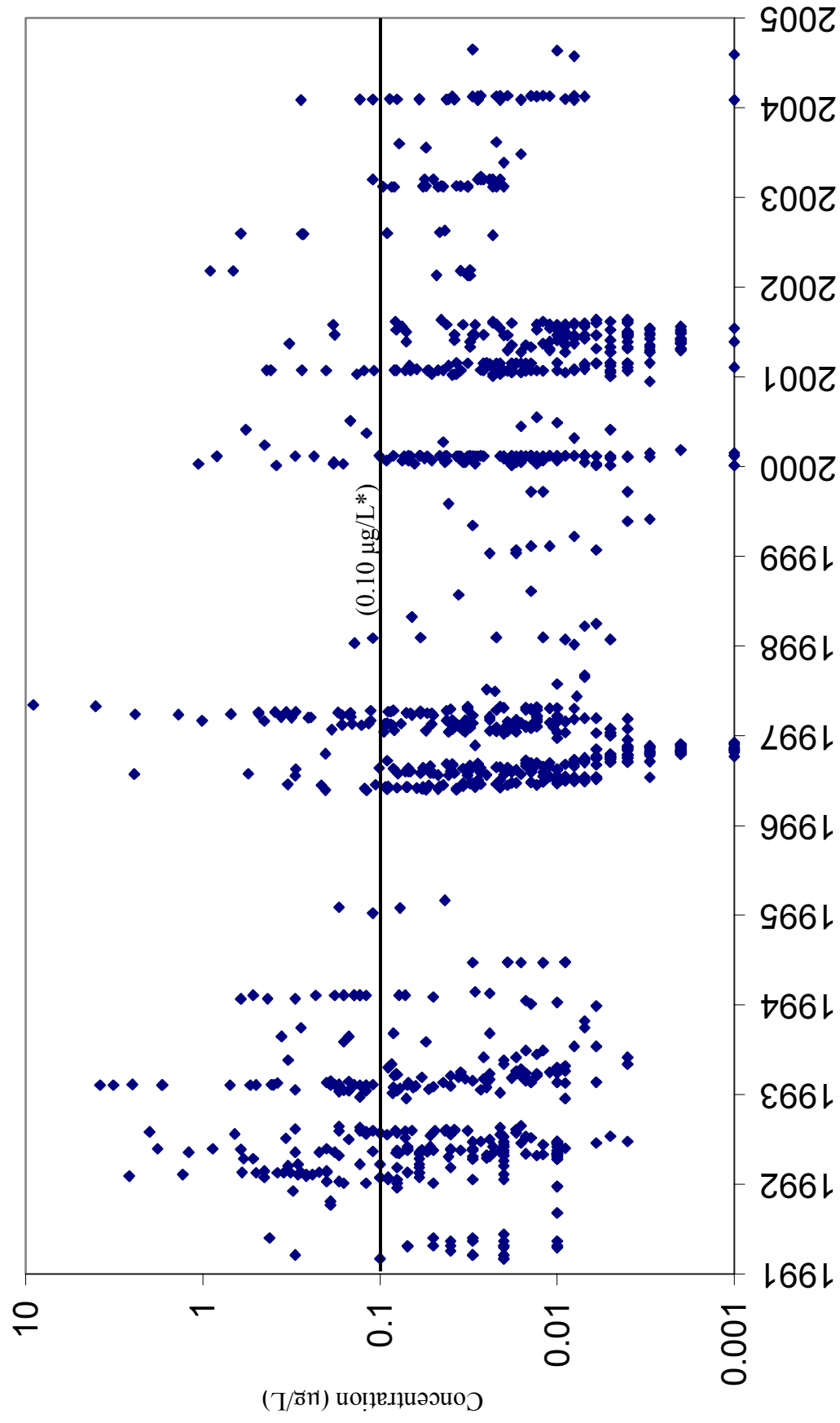


Figure 1.9. Diazinon concentrations in SJR tributaries  
 Data not shown includes 641 non-detect concentration values.  
 \*Acute toxicity water quality target = 0.10  $\mu\text{g/L}$

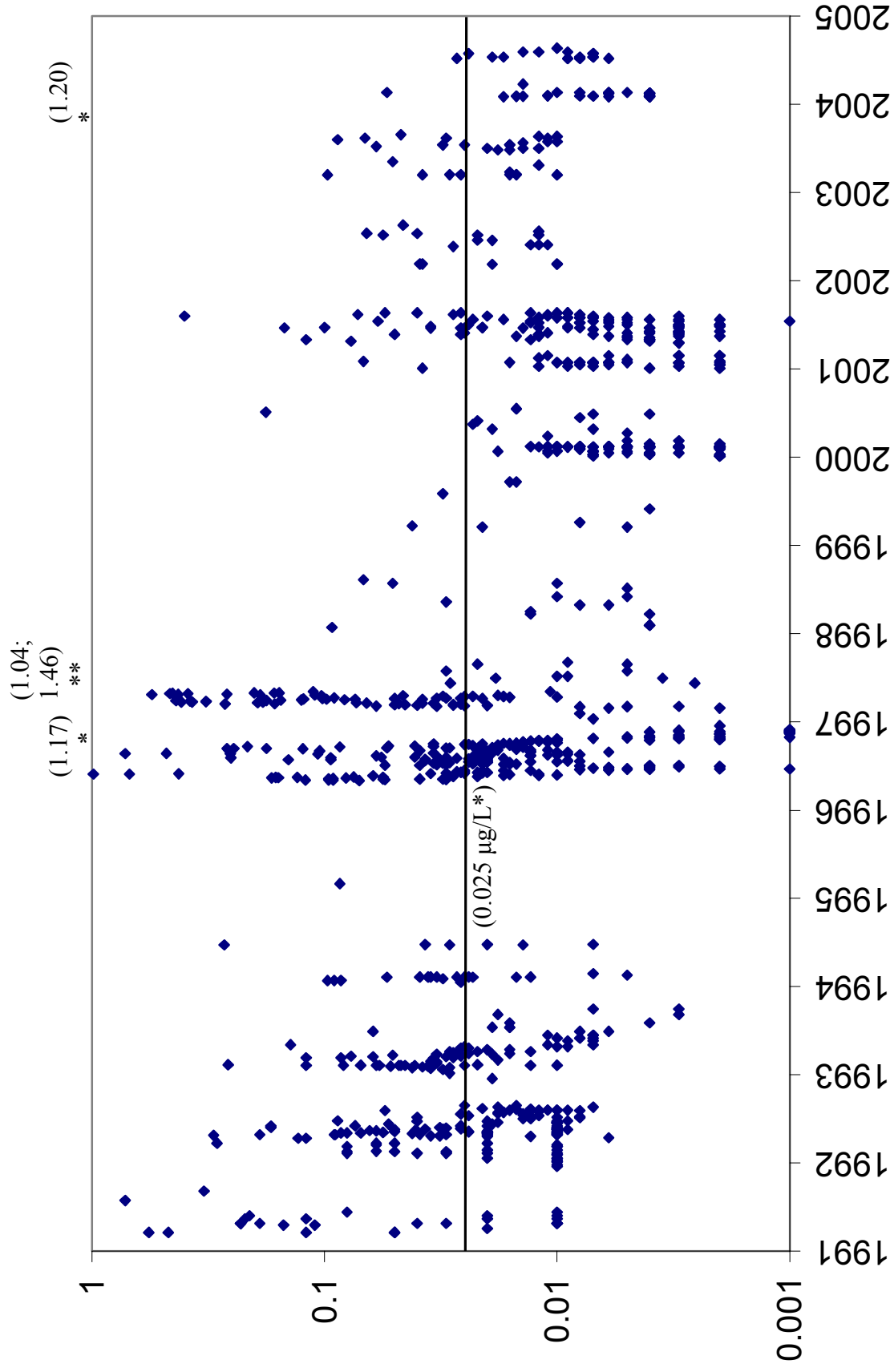


Figure 1.10. Chlorpyrifos concentrations in SJR tributaries  
Data not shown includes 849 non-detect concentration values.

\* Acute water quality objective for chlorpyrifos = 0.025 µg/L

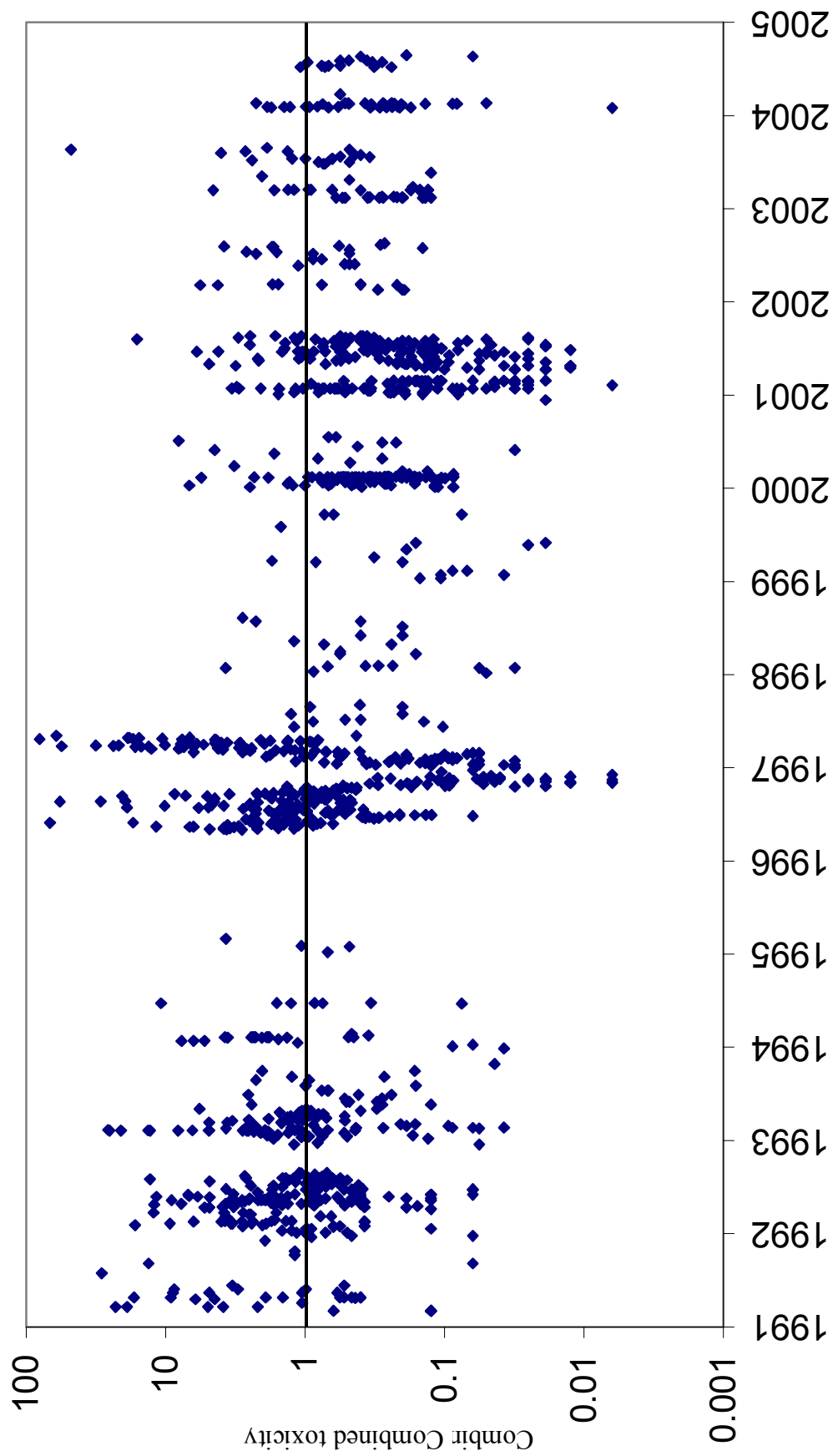


Figure 1.11. Combined chlorpyrifos and diazinon toxicity in SJR tributaries  
Data not shown includes 520 non-detect concentration values.

Table 1.8. Annual Exceedances of Combined Diazinon and Chlorpyrifos Toxicity at the Tributary Sites of the San Joaquin River

Site Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Stanislaus River at Caswell State Park	<b>0%<sup>a</sup></b> 5 <sup>b</sup>	<b>0%</b> 13	<b>0%</b> 2	<b>0%</b> 1	NS <sup>c</sup>	NS	NS	NS	NS	<b>0%</b> 20	<b>4.9%</b> 41	<b>0%</b> 9	<b>5.7%</b> 35	<b>13%</b> 30
Tuolumne River at Shiloh Road	<b>0%</b> 2	<b>13%</b> 15	<b>50%</b> 2	<b>100%</b> 1	NS	NS	NS	NS	NS	<b>5%</b> 20	<b>10%</b> 49	<b>4.5%</b> 22	<b>0%</b> 36	<b>6.4%</b> 31
Del Puerto Creek at Vineyard Road	<b>40%</b> 10	<b>50%</b> 18	<b>0%</b> 2	<b>100%</b> 1	NS	NS	NS	NS	NS	<b>45%</b> 11	<b>22%</b> 23	<b>17%</b> 18	<b>14%</b> 36	NS
Orestimba Creek at River Road	<b>50%</b> 8	<b>58%</b> 66	<b>40%</b> 50	<b>100%</b> 1	<b>100%</b> 1	<b>40%</b> 244	<b>47%</b> 132	<b>12%</b> 32	<b>5.6%</b> 36	<b>15%</b> 46	<b>22%</b> 46	<b>22%</b> 31	<b>14%</b> 35	NS
Merced River at River Road	<b>0%</b> 4	<b>19%</b> 16	<b>48%</b> 42	<b>30%</b> 50	<b>3.4%</b> 29	NS	<b>0%</b> 10	<b>0%</b> 15	<b>0%</b> 15	<b>0%</b> 32	<b>9.1%</b> 44	<b>0%</b> 9	<b>0%</b> 33	<b>0%</b> 26
Mud Slough near Gustine	<b>0%</b> 3	<b>0%</b> 5	<b>50%</b> 2	<b>0%</b> 1	NS	NS	NS	NS	<b>0%</b> 1	NS	<b>9%</b> 22	NS	NS	NS
Salt Slough at Lander Ave.	<b>0%</b> 3	<b>25%</b> 16	<b>36%</b> 28	<b>0%</b> 1	NS	NS	NS	NS	NS	NS	<b>18%</b> 22	<b>0%</b> 1	<b>0%</b> 18	NS
TID Lateral 5 (Harding Drain)	<b>57%</b> 7	<b>46%</b> 41	<b>80%</b> 5	<b>0%</b> 1	NS	NS	NS	NS	<b>0%</b> 1	<b>0%</b> 9	<b>0%</b> 2	NS	NS	NS
Ingram/Hospital Creeks at River Road	<b>54%</b> 11	<b>37%</b> 19	<b>100%</b> 2	<b>0%</b> 2	NS	NS	NS	NS	NS	NS	<b>25%</b> 4	NS	NS	NS
Spanish Grant Drain near Patterson	<b>83%</b> 6	<b>57%</b> 14	<b>50%</b> 2	<b>100%</b> 1	NS	NS	NS	NS	NS	NS	<b>0%</b> 2	NS	NS	NS

<sup>a</sup>Percent of samples for the year for which the combined (additive) toxicity value equals or exceeds 1.0.<sup>b</sup>Total number of samples analyzed for chlorpyrifos and/or diazinon during the year.<sup>c</sup>NS = No samples analyzed during the year.

### **1.3 Need for a Revision to the Basin Plan**

Currently, the Basin Plan does not include a specific program of implementation to address diazinon and chlorpyrifos runoff from orchards and fields in the San Joaquin River watershed. In addition, there are no numeric water quality objectives for diazinon or chlorpyrifos in the Basin Plan for the San Joaquin River.

The Pesticide Management Plan established under the MAA between the State Water Resources Control Board and the Department of Pesticide Regulation, and existing Regional Board Basin Plan policies outline approaches that could result in the establishment of an implementation program and performance measures to assess attainment of water quality objectives. Each of those approaches suggests that the Regional Board should take action if an implementation program has not been established and water quality is not protected.

The Bay Protection Toxic Hot Spots Clean Up Plan (Clean Up Plan; State Board Resolution No. 2004-0002) requires the adoption of a Basin Plan Amendment to control diazinon and chlorpyrifos in the San Joaquin River. The Clean Up Plan states that the Amendment will include: water quality objectives for diazinon and chlorpyrifos; an implementation program and framework; a compliance time schedule; a monitoring program; and other required TMDL elements.

Federal law requires the establishment of TMDLs for waters not attaining water quality standards (CWA § 303(d)(1)(C)). Federal regulations require the incorporation of approved TMDLs into the State's water quality management plan (40 CFR § 130.7(d)(2)). Every region's Basin Plan and any statewide plans or policies constitute California's water quality management plan.

Based on the federal and State requirements and policies discussed above, the Regional Board must develop a control program to address diazinon and chlorpyrifos discharges into the San Joaquin River.

The approach proposed in this Basin Plan Amendment is to establish an agricultural runoff control program that is focused on protecting the San Joaquin River from the impacts of diazinon and chlorpyrifos. The proposed control program is a year-round program, since both pesticides have been detected and criteria have been exceeded throughout the year. Adoption of the Basin Plan Amendment will result in: the establishment of water quality targets for diazinon and water quality objectives for chlorpyrifos; a specific time frame for compliance with applicable objectives and allocations; the establishment of the necessary elements of a TMDL; and an implementation framework for ensuring compliance.

A number of tributaries in the San Joaquin River watershed have been identified as not attaining standards due to elevated levels of diazinon and chlorpyrifos (CRWQCB-CVR, 2001). A more comprehensive Basin Plan Amendment revision is not proposed at this time, since the data and information available for the tributaries are more limited, and the level of effort required to meet water quality objectives is less clear. It is anticipated that a future amendment to the Basin Plan

will be required to address diazinon and chlorpyrifos runoff in the tributaries to the San Joaquin River.

## **2 Proposed Amendments to the Basin Plan**

The proposed Basin Plan amendment consists of additions and modifications to several sections of the current Basin Plan. This section contains the proposed changes to the Basin Plan. Deletions are shown in strikeout, and additions are shown by underline.

The appropriate location of each change is provided by the Basin Plan page numbers in the lower right corner. The final placement of the proposed changes in the Basin Plan may differ from the placement indicated in this section, since there are a number of amendments to the Basin Plan that are currently pending. Any change in placement will be done to enhance the readability of the Basin Plan and will not result in a change in meaning or intent.

The recommended changes to Chapter I are identical to those contained in Regional Board Resolution No. R5-2004-0108. Should that resolution become effective prior to Regional Board adoption of this Basin Plan Amendment, the recommended changes to Chapter I contained in this Amendment will be moot and will be removed.

*Under the Chapter I heading: “Basin Description beginning on page I-1.00, make the following changes:*

This Basin Plan covers the entire area included in the Sacramento and San Joaquin River drainage basins (see maps in pocket\* and Figure II-1). The basins are bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. They extend some 400 miles from the California - Oregon border southward to the headwaters of the San Joaquin River.

\*NOTE: The planning boundary between the San Joaquin River Basin and the Tulare Lake Basin follows ~~the northern boundary of Little Panoche Creek basin~~ the southern watershed boundaries of the Little Panoche Creek, Moreno Gulch, and Capita Canyon to boundary of the Westlands Water District. From here, the boundary follows the northern edge of the Westlands Water District until its intersection with the Firebaugh Canal Company’s Main Lift Canal. The basin boundary then follows the Main Lift Canal to the Mendota Pool and continues eastward along the channel of the San Joaquin River to Millerton Lake in the Sierra Nevada foothills, and then follows along the southern boundary of the San Joaquin River drainage basin.

The Sacramento River and San Joaquin River Basins cover about one fourth of the total area of the State and over 30% of the State's irrigable land. The Sacramento and San Joaquin Rivers furnish roughly 51% of the State's water supply. Surface water from the two drainage basins meet and form the Delta, which ultimately drains to San Francisco Bay. Two major water projects, the Federal Central Valley Project and the State Water Project, deliver water from the Delta to Southern California, the San Joaquin Valley, Tulare Lake Basin, the San Francisco Bay area, as well as within the Delta boundaries.

The Delta is a maze of river channels and diked islands covering roughly 1,150 square miles, including 78 square miles of water area. The legal boundary of the Delta is described in Section 12220 of the Water Code (also see Figure III-1 of this Basin Plan).

Ground water is defined as subsurface water that occurs beneath the ground surface in fully saturated zones within soils and other geologic

formations. Where ground water occurs in a saturated geologic unit that contains sufficient permeability and thickness to yield significant quantities of water to wells or springs, it can be defined as an aquifer (USGS, Water Supply Paper 1988, 1972). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, *Groundwater Hydrology*, 1980).

Major ground water basins underlie both valley floors, and there are scattered smaller basins in the foothill areas and mountain valleys. In many parts of the Region, usable ground waters occur outside of these currently identified basins.

There are water-bearing geologic units within ground water basins in the Region that do not meet the definition of an aquifer. Therefore, for basin planning and regulatory purposes, the term "ground water" includes all subsurface waters that occur in fully saturated zones and fractures within soils and other geologic formations, whether or not these waters meet the definition of an aquifer or occur within identified ground water basins.

## Sacramento River Basin

The Sacramento River Basin covers 27,210 square miles and includes the entire area drained by the Sacramento River. For planning purposes, this includes all watersheds tributary to the Sacramento River that are north of the Cosumnes River watershed. It also includes the closed basin of Goose Lake and drainage sub-basins of Cache and Putah Creeks.

The principal streams are the Sacramento River and its larger tributaries: the Pit, Feather, Yuba, Bear, and American Rivers to the east; and Cottonwood, Stony, Cache, and Putah Creeks to the west. Major reservoirs and lakes include Shasta, Oroville, Folsom, Clear Lake, and Lake Berryessa.

DWR Bulletin 118-80 identifies 63 ground water basins in the Sacramento watershed area. The Sacramento Valley floor is divided into 2 ground water basins. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

## San Joaquin River Basin

The San Joaquin River Basin covers 15,880 square miles and includes the entire area drained by the San Joaquin River. It includes all watersheds tributary to the San Joaquin River and the Delta south of the Sacramento River and south of the American River watershed. The southern planning boundary is described in the first paragraph of the previous page.

The principal streams in the basin are the San Joaquin River and its larger tributaries: the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers. Major reservoirs and lakes include Padre, New Hogan, Millerton, McClure, Don Pedro, and New Melones.

DWR Bulletin 118-80 identifies 39 ground water basins in the San Joaquin watershed area. The San Joaquin Valley floor is divided into 15 separate ground water basins, largely based on political considerations. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

### Grassland Watershed

The Grassland watershed is a valley floor sub-basin of the San Joaquin River Basin. The portion of the watershed for which agricultural subsurface drainage policies and regulations apply covers an area of approximately 370,000 acres, and is bounded on the north by the alluvial fan of Orestimba Creek and by the Tulare Lake Basin to the south. The San Joaquin River forms the eastern boundary and Interstate Highway 5 forms the approximate western boundary. The San Joaquin River forms a wide flood plain in the region of the Grassland watershed.

The hydrology of the watershed has been irreversibly altered due to water projects, and is presently governed by land uses. These uses are primarily managed wetlands and agriculture. The wetlands form important waterfowl habitat for migratory waterfowl using the Pacific Flyway. The alluvial fans of the western and southern portions of the watershed contain salts and selenium, which can be mobilized through irrigation practices, and can impact beneficial

uses of surface waters and wetlands if not properly regulated.

## Lower San Joaquin River Watershed and Subareas

Technical descriptions of the Lower San Joaquin River (LSJR) and its component subareas are contained in Appendix 41. General descriptions follow: The LSJR watershed encompasses approximately 4,580 square miles in Merced County and portions of Fresno, Madera, San Joaquin, and Stanislaus counties. For planning purposes, the LSJR watershed is defined as the area draining to the San Joaquin River downstream of the Mendota Dam and upstream of the Airport Way Bridge near Vernalis, excluding the areas upstream of dams on the major Eastside reservoirs: New Don Pedro, New Melones, Lake McClure, and similar Eastside reservoirs in the LSJR system. The LSJR watershed excludes all lands within Calaveras, Tuolumne, San Benito, and Mariposa Counties. The LSJR watershed has been subdivided into seven major sub areas. In some cases major subareas have been further subdivided into minor subareas to facilitate more effective and focused water quality planning (Table I-1).

**Table I-1 Lower San Joaquin River Subareas**

Major Subareas		Minor Subareas	
1	LSJR upstream of Salt Slough	1a	Bear Creek
		1b	Fresno-Chowchilla
2	Grassland	-- --	
3	East Valley Floor	3a	Northeast Bank
		3b	North Stanislaus
		3c	Stevinson
		3d	Turlock Area
4	Northwest Side	4a	Greater Orestimba
		4b	Westside Creeks
		4c	Vernalis North
5	Merced River	-- --	
6	Tuolumne River	-- --	
7	Stanislaus River	-- --	

### 1. Lower San Joaquin River upstream of Salt Slough

This subarea drains approximately 1,480 square miles on the east side of the LSJR upstream of the Salt Slough confluence. The subarea includes the portions of the Bear Creek, Chowchilla River and Fresno River watersheds that are contained within Merced and Madera

Counties. The northern boundary of the subarea generally abuts the Merced River Watershed. The western and southern boundaries follow the San Joaquin River from the Lander Avenue Bridge to Friant, except for the lands within the Columbia Canal Company, which are excluded. Columbia Canal Company lands are included in the Grassland Subarea. This subarea is composed of the following drainage areas:

**1a. Bear Creek (effective drainage area)**

This minor subarea is a 620 square mile subset of lands within the LSJR upstream of Salt Slough Subarea. The Bear Creek Minor Subarea is predominantly comprised of the portion of the Bear Creek Watershed that is contained within Merced County.

**1b. Fresno-Chowchilla**

The Fresno-Chowchilla Minor Subarea is comprised of approximately 860 square miles of land within the southern portion of the LSJR upstream of Salt Slough Subarea. This minor subarea is located in southeastern Merced County and western Madera County and contains the land area that drains into the LSJR between Sack Dam and the Bear Creek confluence, including the drainages of the Fresno and Chowchilla Rivers.

**2. Grassland**

The Grassland Subarea drains approximately 1,370 square miles on the west side of the LSJR in portions of Merced, Stanislaus, and Fresno Counties. This subarea includes the Mud Slough, Salt Slough, and Los Banos Creek watersheds. The eastern boundary of this subarea is generally formed by the LSJR between the Merced River confluence and the Mendota Dam. The Grassland Subarea extends across the LSJR, into the east side of the San Joaquin Valley, to include the lands within the Columbia Canal Company. The western boundary of the subarea generally follows the crest of the Coast Range with the exception of lands within San Benito County, which are excluded.

**3. East Valley Floor**

This subarea includes approximately 413 square miles of land on the east side of the LSJR that drains directly to the LSJR between the Airport Way Bridge near Vernalis and the Salt Slough confluence. The subarea is largely comprised of

the land between the major east-side drainages of the Tuolumne, Stanislaus, and Merced Rivers. This subarea lies within central Stanislaus County and north-central Merced County. Numerous drainage canals, including the Harding Drain and natural drainages, drain this subarea. The subarea is comprised of the following minor subareas:

**3a. Northeast Bank**

This minor subarea of the East Valley Floor contains all of the land draining the east side of the San Joaquin River between the Maze Boulevard Bridge and the Crows Landing Road Bridge, except for the Tuolumne River subarea. The Northeast Bank covers approximately 123 square miles in central Stanislaus County.

**3b. North Stanislaus**

The North Stanislaus minor subarea is a subset of lands within the East Valley Floor Subarea. This minor subarea drains approximately 68 square miles of land between the Stanislaus and Tuolumne River watersheds that flows into the San Joaquin River between the Airport Way Bridge near Vernalis and the Maze Boulevard Bridge.

**3c. Stevinson**

This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Merced River confluence and the Lander Avenue (Highway 165) Bridge. The Stevinson Minor Subarea occupies approximately 44 square miles in north-central Merced County.

**3d. Turlock Area**

This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Crows Landing Road Bridge and the Merced River confluence. The Turlock Area Minor Subarea occupies approximately 178 square miles in south-central Stanislaus County and northern Merced County.

**4. Northwest Side**

This 574 square mile area generally includes the lands on the West side of the LSJR between the Airport Way Bridge near Vernalis and the Newman Waste way confluence. This subarea includes the entire drainage area of Orestimba, Del Puerto, and Hospital/Ingram Creeks. The subarea is primarily located in Western Stanislaus County except for a small area that

extends into Merced County near the town of Newman and the Central California Irrigation District Main Canal.

#### **4a. Greater Orestimba**

The Greater Orestimba Minor Subarea is a 285 square mile subset of the Northwest Side Subarea located in southwest Stanislaus County and a small portion of western Merced County. It contains the entire Orestimba Creek watershed and the remaining area that drains into the LSJR from the west between the Crows Landing Road Bridge and the confluence of the Merced River, including Little Salad and Crow Creeks.

#### **4b. Westside Creeks**

This Minor Subarea is comprised of 277 square miles of the Northwest Side Subarea in western Stanislaus County. It consists of the areas that drain into the west side of the San Joaquin River between Maze Boulevard and Crows Landing Road, including the drainages of Del Puerto, Hospital, and Ingram Creeks.

#### **4c. Vernalis North**

The Vernalis North Minor Subarea is a 12 square mile subset of land within the most northern portion of the Northwest Side Subarea. It contains the land draining to the San Joaquin River from the west between the Maze Boulevard Bridge and the Airport Way Bridge near Vernalis.

### **5. Merced River**

This 294 square mile subarea is comprised of the Merced River watershed downstream of the Merced-Mariposa county line and upstream of the River Road Bridge. The Merced River subarea includes a 13-square-mile “island” of land (located between the East Valley Floor and the Tuolumne River Subareas) that is hydrologically connected to the Merced River by the Highline Canal.

### **6. Tuolumne River**

This 294 square mile subarea is comprised of the Tuolumne River watershed downstream of the Stanislaus-Tuolumne county line, including the drainage of Turlock Lake, and upstream of the Shiloh Road Bridge.

### **7. Stanislaus River**

This 157 square mile subarea is comprised of the Stanislaus River watershed downstream of the Stanislaus-Calaveras county line and upstream of Caswell State Park.

## Pesticides

- No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses.
- Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses.
- Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer.
- Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies (see State Water Resources Control Board Resolution No. 68-16 and 40 C.F.R. Section 131.12.).
- Pesticide concentrations shall not exceed the lowest levels technically and economically achievable.
- Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the Maximum Contaminant Levels set forth in

California Code of Regulations, Title 22, Division 4, Chapter 15.

- Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of thiobencarb in excess of 1.0 µg/l.
- Concentrations of diazinon and chlorpyrifos shall not exceed the levels identified in Table III-2A

Where more than one objective may be applicable, the most stringent objective applies.

For the purposes of this objective, the term pesticide shall include: (1) any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever, or (2) any spray adjuvant, or (3) any breakdown products of these materials that threaten beneficial uses. Note that discharges of "inert" ingredients included in pesticide formulations must comply with all applicable water quality objectives.

TABLE III-2A  
SPECIFIC PESTICIDE OBJECTIVES

PESTICIDE	MAXIMUM CONCENTRATION AND AVERAGING PERIOD	APPLICABLE WATER BODIES
<u>Chlorpyrifos</u>	<u>0.025 <math>\mu</math> g/L ; 1-hour average (acute)</u> <u>0.014 <math>\mu</math> g/L ; 4-day average (chronic)</u> <u>Not to be exceeded more than once in a</u> <u>three year period.</u>	<u>San Joaquin River from Mendota Dam to Vernalis (Reaches</u> <u>include Mendota Dam to Sack Dam (70), Sack Dam to Mouth of</u> <u>Merced River (71), Mouth of Merced River to Vernalis (83))</u>

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review and control authority. The Board will work with water agencies and others whose activities may influence pesticide levels to minimize concentrations in surface waters.

Since the discharge of pesticides into surface waters will be allowed under certain conditions, the Board will take steps to ensure that this control program is conducted in compliance with the federal and state antidegradation policies. This will primarily be done as pesticide discharges are evaluated on a case-by-case basis.

**Insert to Chapter IV Implementation after 7.  
Diazinon Discharges into the Sacramento and Feather Rivers**

**8. Control of Diazinon and Chlorpyrifos  
Runoff into the San Joaquin River**

Beginning December 1, 2008, the direct or indirect discharge of diazinon or chlorpyrifos into the San Joaquin River is prohibited during the dormant season (1 December through 1 March) if any exceedance of the chlorpyrifos water quality objective; diazinon and chlorpyrifos loading capacity; or diazinon and chlorpyrifos load allocations occurred during the previous dormant season. The prohibition applies only to direct or indirect discharges of diazinon or chlorpyrifos to surface water bodies that are tributary to or upstream from the location where the water quality objective; loading capacity; or load allocations were exceeded.

Beginning March 2, 2009, the direct or indirect discharge of diazinon or chlorpyrifos into the San Joaquin River is prohibited during the irrigation season (2 March through 30 November) if any exceedance of the chlorpyrifos water quality objective; diazinon and chlorpyrifos loading capacity; or diazinon and chlorpyrifos load allocations occurred during the previous irrigation season. The prohibition applies only to direct or indirect discharges of diazinon or chlorpyrifos to surface water bodies that are tributary to or upstream from the location where the water quality objective; loading capacity; or load allocations were exceeded.

These prohibitions do not apply if the discharge of diazinon or chlorpyrifos is subject to a waiver of waste discharge requirements implementing the chlorpyrifos water quality objectives and load allocations for diazinon and chlorpyrifos for the San Joaquin River, or governed by individual or general waste discharge requirements.

**Insert to Chapter IV Implementation page 36.01**

**Diazinon and Chlorpyrifos Runoff in the San Joaquin River Basin**

1. The pesticide runoff control program shall:
  - a. Ensure compliance with water quality objectives applicable to diazinon and chlorpyrifos in the San Joaquin River through the implementation of necessary management practices.
  - b. Ensure that measures that are implemented to reduce discharges of diazinon and chlorpyrifos do not lead to an increase in the discharge of other pesticides to levels that cause or contribute to violations of applicable water quality objectives and Regional Water Board policies; and
  - c. Ensure that discharges of pesticides to surface waters are controlled so that pesticide concentrations are at the lowest levels that are technically and economically achievable.
2. Dischargers must consider whether a proposed alternative to diazinon or chlorpyrifos has the potential to degrade ground or surface water. If the alternative has the potential to degrade groundwater, alternative pest control methods must be considered. If the alternative has the potential to degrade surface water, control measures must be implemented to ensure that applicable water quality objectives and Regional Board policies are not violated, including State Water Resources Control Board Resolution 68-16.
3. Compliance with water quality objectives, waste load allocations, and load allocations for diazinon and chlorpyrifos in the San Joaquin River is required by December 1, 2008.

The water quality objectives and allocations will be implemented through one or a combination of the following: the adoption of one or more waivers of waste discharge requirements, and general or individual waste discharge requirements. To the extent not already in place, the Regional Water Board expects to adopt or revise the appropriate waiver(s) or waste discharge requirements by December 31, 2007.

4. The Regional Board will review the diazinon and chlorpyrifos allocations and the implementation provisions in the Basin Plan at least once every five years, beginning no later than December 31, 2007.
5. Regional Board staff will meet at least annually with staff from the Department of Pesticide Regulation and representatives from the California Agricultural Commissioners and Sealers Association to review pesticide use and instream pesticide concentrations during the dormant spray and irrigation application seasons, and to consider the effectiveness of management measures in meeting water quality objectives and load allocations.
6. The Waste Load Allocations (WLA) for all NPDES-permitted dischargers, Load Allocations (LA) for nonpoint source discharges, and the Loading Capacity of the San Joaquin River from the Mendota Dam to Vernalis shall not exceed one toxic unit (TU) of diazinon and chlorpyrifos as defined below.

$$TU = \frac{C_D}{WQTI_D} + \frac{C_C}{WQO_C} \leq 1.0$$

where

$C_D$  = diazinon concentration of point source discharge for the WLA; nonpoint source discharge for the LA; or San Joaquin River for the LC.

$C_C$  = chlorpyrifos concentration of point source discharge for the WLA; nonpoint source discharge for the LA; or San Joaquin River for the LC.

$WQTI_D$  = acute or chronic diazinon water quality target for protection of aquatic invertebrates.

$WQO_C$  = acute or chronic chlorpyrifos water quality objective in µg/L

The acute  $WQTI_D$  is 0.160 µg/L as an 1-hour average. The chronic  $WQTI_D$  is 0.100 µg/L as a four day average.

In addition to consideration of the additive toxicity of diazinon and chlorpyrifos to aquatic invertebrates, a water quality target for diazinon is established to protect salmon ( $WQTS_D$ ). The  $WQTS_D$  is 0.100 µg/L as an 1-hour average. The Waste Load Allocations (WLA) for all NPDES-

permitted dischargers, Load Allocations (LA) for nonpoint source discharges, and the Loading Capacity for diazinon shall not exceed the WQTS<sub>D</sub>.

The water quality targets for diazinon represent the best available information for interpretation of compliance with the Regional Water Board's narrative toxicity and pesticide water quality objectives. The diazinon water quality targets will be used to evaluate progress towards attainment of the narrative water quality objectives. The Regional Water Board intends to adopt diazinon water quality objectives for the San Joaquin River prior to the compliance dates for the loading capacity and allocations. In absence of diazinon water quality objectives, interpretation of compliance with applicable narrative water quality objectives will be based on the best available information at the time compliance is evaluated and in accordance with Basin Plan policies for evaluating compliance with the applicable narrative water quality objectives.

Available samples collected within the applicable averaging period for the water quality objective will be used to determine compliance with the allocations and loading capacity. For purposes of performing the toxic units calculation, analytical results that are reported as "non-detectable" concentrations are considered to be zero.

At a minimum, Loading Capacity shall be calculated for each of the following six water quality compliance points in the San Joaquin River:

- San Joaquin River at the Airport Way Bridge near Vernalis (United States Geological Survey (USGS) Identification Number 11303500)
- San Joaquin River at the Maze Boulevard (Highway 132) Bridge (USGS Identification Number 11290500)
- San Joaquin River at Las Palmas Avenue near Patterson (USGS Identification Number 11274570)
- San Joaquin River at Hills Ferry Road
- San Joaquin River at Highway 165 near Stevinson (USGS Identification Number 11260815)
- San Joaquin River at Sack Dam

6. The load allocations for non-point source discharges into the San Joaquin River are assigned to the following subareas:
  - a. The combined Stanislaus River; North Stanislaus; and Vernalis North subareas.
  - b. The combined Tuolumne River; Northeast Bank; and Westside Creek subareas.
  - c. The combined Turlock; Merced; and Greater Orestimba subareas.
  - d. The combined Stevinson and Grassland subareas.
  - e. The combined Bear Creek and Fresno-Chowchilla subareas.
7. The established waste load and load allocations for diazinon and chlorpyrifos, and the water quality objectives for chlorpyrifos in the San Joaquin River represent a maximum allowable level. The Regional Water Board shall require any additional reductions in diazinon and chlorpyrifos levels necessary to account for additional additive or synergistic toxicity effects or to protect beneficial uses in tributary waters.
8. Pursuant to CWC Section 13267, dischargers must submit a management plan that describes the actions that the discharger will take to reduce diazinon and chlorpyrifos discharges and meet the applicable allocations by the required compliance date.

The management plan may include actions required by State and federal pesticide regulations. The discharger must document the relationship between the actions to be taken and the expected reductions in diazinon and chlorpyrifos discharges. Individual dischargers or a discharger group or coalition may submit management plans.

The management plan must comply with the provisions of any applicable waiver of waste discharge requirements or waste discharge requirements and must be submitted no later than June 30, 2006. The Regional Water Board may require revisions to the management plan if compliance with applicable allocations is not attained or the management plan is not reasonably likely to attain compliance.

9. Any waiver of waste discharge requirements or waste discharge requirements that govern the control of pesticide runoff that is discharged directly or indirectly into the San Joaquin River

must be consistent with the policies and actions described in paragraphs 1 – 8.

10. In determining compliance with the waste load allocations, the Regional Water Board will consider any data or information submitted by the discharger regarding diazinon and chlorpyrifos inputs from sources outside of the jurisdiction of the permitted discharger, including any diazinon and chlorpyrifos present in precipitation; and any applicable provisions in the discharger's NPDES permit requiring the discharger to reduce the discharge of pollutants to the maximum extent possible.

**Add to “Estimated Costs of Agricultural Water Quality Control Programs and potential Sources of Financing” section-**

The total estimated costs for management practices to meet the diazinon and chlorpyrifos objectives for the San Joaquin River range from \$720,000 to \$12 million for the dormant season, and from \$7 million to \$9.6 million for the irrigation season. The estimated costs for discharger compliance monitoring, planning and evaluation range from \$600,000 to \$9,500,000.

Potential funding sources include:

1. Those identified in the San Joaquin River Subsurface Agricultural Drainage Control Program and the Pesticide Control Program.

**Add to Chapter 5 Surveillance and Monitoring**

The Regional Water Board requires a focused monitoring effort of pesticide runoff from orchards and fields in the San Joaquin Valley.

The monitoring and reporting program for any waste discharge requirements or waiver of waste discharge requirements that addresses pesticide runoff from orchards and fields in the San Joaquin valley must be designed to collect the information necessary to:

- 1.determine compliance with established water quality objectives and the loading capacity applicable to diazinon and chlorpyrifos in the San Joaquin River;
2. determine compliance with established load allocations for diazinon and chlorpyrifos;
3. determine the degree of implementation of management practices to reduce off-site movement of diazinon and chlorpyrifos;
4. determine the effectiveness of management practices and strategies to reduce off-site migration of diazinon and chlorpyrifos;

5. determine whether alternatives to diazinon and chlorpyrifos are causing surface water quality impacts;

6. determine whether the discharge causes or contributes to a toxicity impairment due to additive or synergistic effects of multiple pollutants; and

7. demonstrate that management practices are achieving the lowest pesticide levels technically and economically achievable.

Dischargers are responsible for providing the necessary information. The information may come from the dischargers' monitoring efforts; monitoring programs conducted by State or federal agencies or collaborative watershed efforts; or from special studies that evaluate the effectiveness of management practices.